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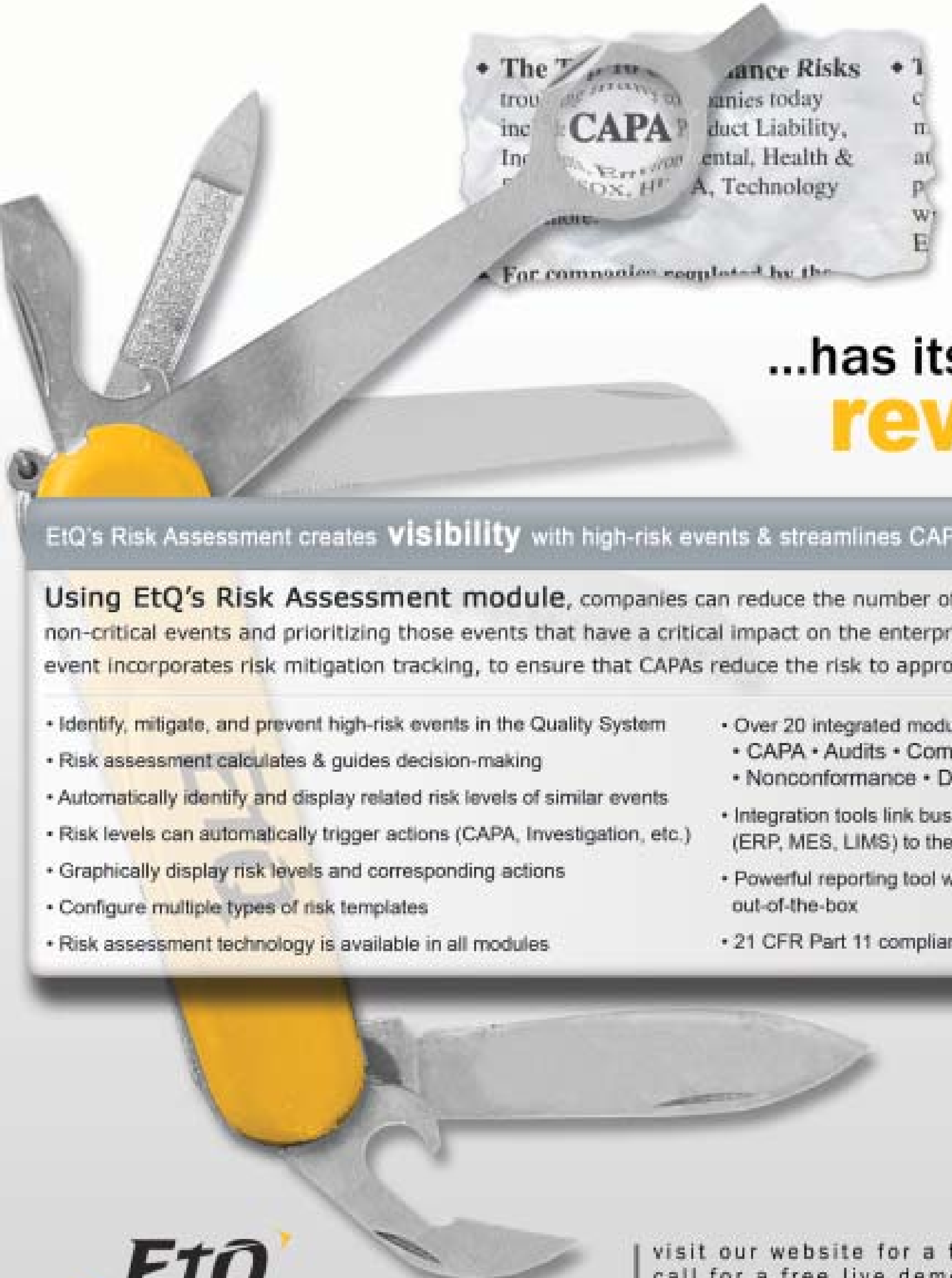

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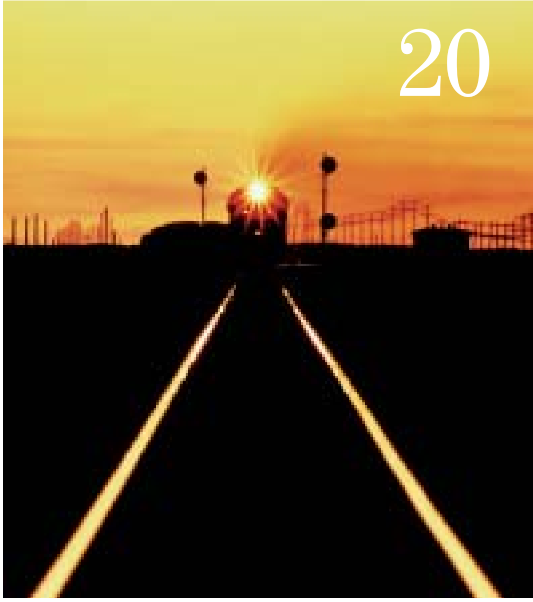

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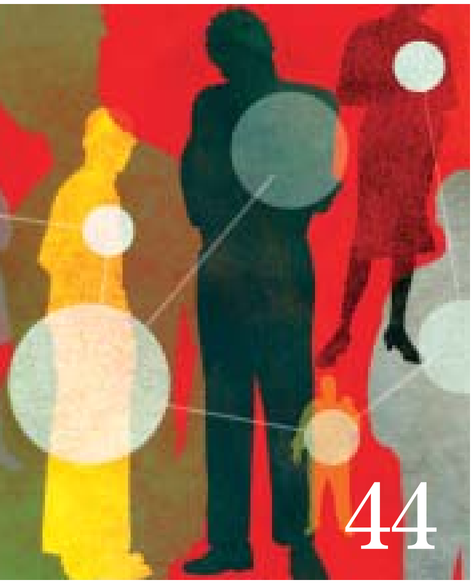

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UPFRONT

Safe and Sound

Product quality in a global marketplace

AS THE BARRIERS to international business swiftly crumble and supply chains mesh into a wider and thicker net across the globe, the issue of product safety has taken on new significance.

Consider that a cell phone—something small enough to fit into your pocket—can include parts from as many as 200 suppliers, according to Ted C. Fishman in his book *China, Inc.* The result: the potential for unwieldy supplier networks. In addition, increased competition has pushed price high on the list of buyers' decision-making criteria, and reliability and quality can suffer.

"Along these uncountable supply chains spread around the world, the China price rules the imaginations of corporate purchasers ... the constant push to the rock-bottom price has had a profound impact on the way the world makes things. Which means it also has a profound impact on people," Fishman writes.

These trends put a spotlight on accountability. Who is ultimately responsible for defective or dangerous materials found in household products, toys and food? Who is to blame when dangerous products wind up in the hands of consumers?

In the article "Better Safe Than Sorry," p. 28, author Randall Goodden seeks to clarify the true origins of design flaws and other defects that led to the record number of product recalls in 2007. He contends that many recalls are not the result of Chinese and other foreign products, but of design or safety hazards unknowingly built into product specifications, then adhered to and enforced by quality departments.

Often, Goodden writes, these defective products are manufactured because the companies that design them are working from a limited knowledge base related to product safety issues and requirements.

"Last year's recalls weren't just a supply chain problem," Goodden writes. "They were the result of the primary corporation failing in one of the following areas: design reviews and product development; product safety and hazards analysis efforts; product testing; supplier selection, inspection and control; and in-process quality control."

The toy industry found itself in the spotlight when it was plagued by recalls and the subsequent fallout in 2007. A few companies, however, managed to avoid the melee. In "K'NEX Success," p. 36, assistant editor Brett Krzykowski profiles one toymaker that wasn't touched by recalls last year, mostly because of its knack for managing procurement and maintaining time-tested supply chain partnerships.

While other toymakers saw profits dip, K'NEX reported 12% growth in 2007. The company's approach to product quality through supplier relationships offers a compelling example of how companies can succeed by building strong foundations.

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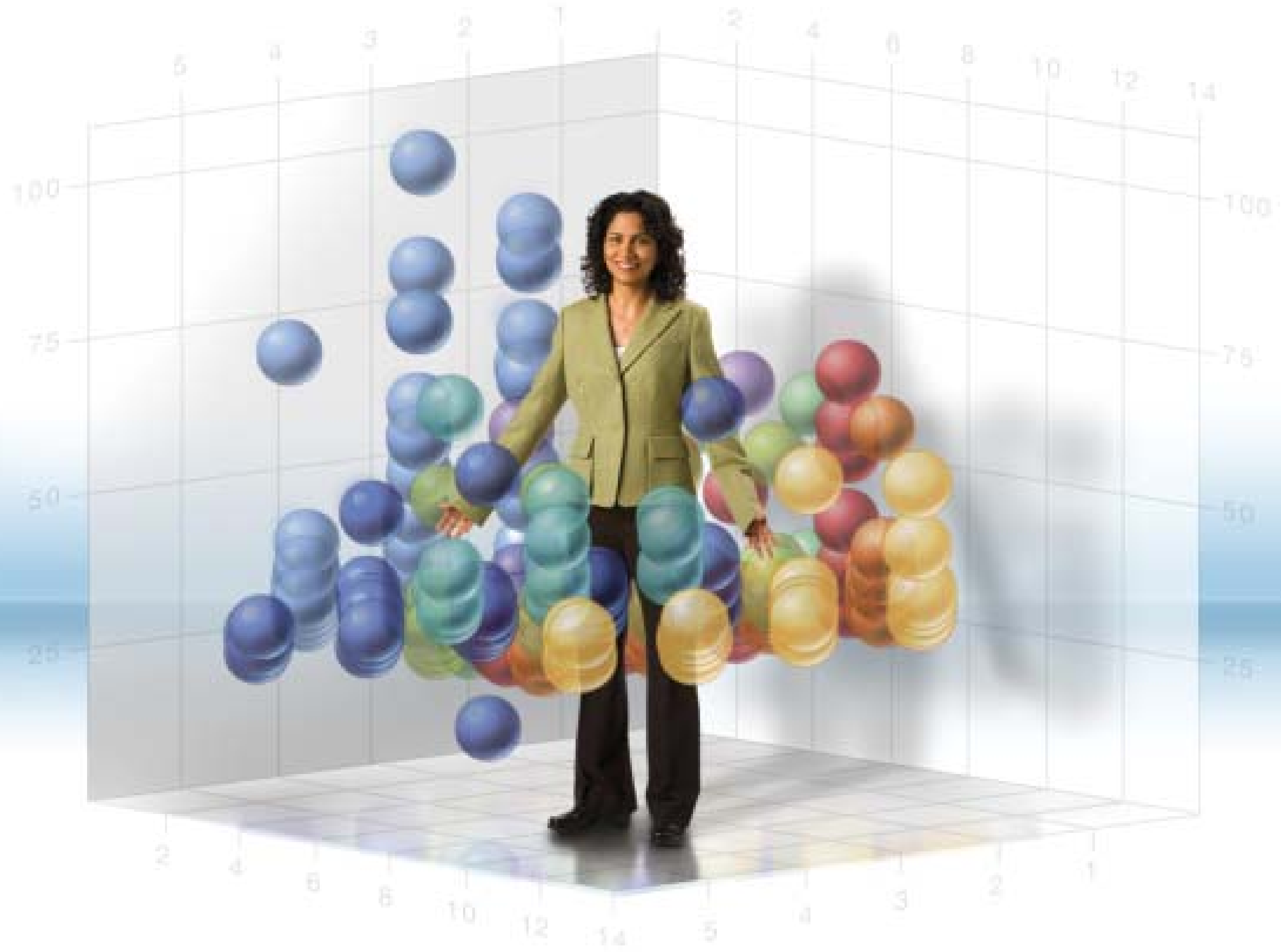

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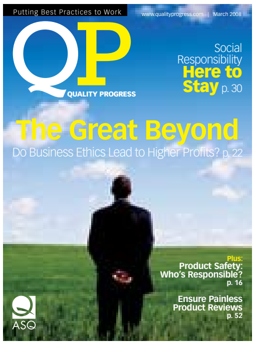
INBOX

Recall relationships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ASQ

Please elaborate on a point made in the article about product safety, "Making Retailers Responsible?" ("Keeping Current," March 2008, p. 16). In that article, which used toy products as an example, is a statement that "U.S. companies that sell the products have 'the ultimate responsibility' at the end of the day to make sure that their products are safe …"

I'm certain I am not familiar enough with the various entities involved, but to me it seems as though the toy companies are getting off the hook with such a shifted focus. So please explain the relationships and chain of discussions among suppliers, manufacturers and retailers relative to the following:

1. Which entity ultimately states the product requirements? Is it the retailer, or is it the toy company?
2. Which entity ultimately analyzes the requirements to design the products?
3. Which entity ultimately provides the product specifications?

Wally Robinson
State Teachers Retirement System
Columbus, OH

Expert response

I will try to answer your questions, but let me state in general that the party bringing the Chinese products into the United States will be held ultimately responsible for the safety of the products. So, if it was a U.S. toy company, retailer or household appliance company that supplied retailers with coffee makers or microwaves, or a lawn and garden supplier that distributed lawn mowers or electric drills to retailers, those importers of the products would be held responsible for the products themselves.

Some retailers, like Toys R Us and Wal-Mart, also import products directly from China and place them on their store shelves without any middleman involved. In those situations, the retailer will be held directly responsible for product safety.

Those who import products that don't meet U.S. safety standards will face fines from the Consumer Product Safety Commission and will be at fault in a product liability lawsuit. You can't sue a Chinese manufacturer that doesn't maintain a presence in the United States.

Regarding the questions posed:

1. The party that orders the product from China is responsible for the product, whether that same company or importer told the Chinese company how to build the product or whether they imported something designed and manufactured by the Chinese company.
2. The importing or purchasing entity would ultimately be held responsible for analyzing the design of the products it imports. Many of these U.S. companies or retailers are hiring third-party companies in China to analyze what they are purchasing and ensure the products comply with all requirements.
3. In some cases, the U.S. company supplies the Chinese manufacturer with product specifications. In some cases, the Chinese manufacturer creates the product specifications. In both cases, the U.S. entity that imports them to the United States will be responsible for the product, regardless of where the product specifications originated.

Randall Goodden
Chairman, ASQ Product Safety and Liability Division

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Who should be responsible?

The March 2008 issue of QP featured much discussion of business ethics, also known as corporate social responsibility. While the pieces were somewhat informative, they featured the common assumption that businesses giving back to society through philanthropy are more ethical than those that do not. Such an altruistic view resonates well with adherents of Judeo-Christian ethics, as well as many of the postmodernist persuasion, but it is by no means a universally accepted principle.

None of the pieces addressed the topic of ethics, choosing rather to rely on a nebulous lay connotation. However, even a fairly straightforward definition of ethics—a code of values to guide actions as they relate to interactions among people—indicates that many people who would consider themselves quite ethical would disagree with the conclusions and prescriptions contained in the March issue.

Consider Bjørn Andersen's view that the highest level of social responsibility is philanthropy, or giving back to society ("A Framework for Business Ethics," p. 22). This statement at least implicitly assumes the firm at some point took something from society. What did it take? What it provided were, among other things, jobs, tax revenues for the local, state and federal governments, and increased spending in the local economy. One could argue as easily that it is society who should give back to the firm.

There is nothing intrinsically wrong with philanthropy. Nor is there anything ethically superior about it. A firm has options regarding use of profits. They might choose to reinvest most or all in the company to improve long-term capital or increase wages. Arguing that philanthropy is a moral imperative might be comforting to Kantians around the globe, but throwing money at certain charities or the arts might well be performing a disservice to your employees and shareholders.

Andersen argues that "the more money a company can charge for a product or service of less value, the higher the profits." Any student in an introductory economics class should recognize flaws in that statement.

First, if the price increases while holding quality constant, value (by definition) decreases. Such an occurrence will reduce, not increase, the quantity demanded. Depending on the price elasticity of demand at the given price, revenues (and therefore, profits) might also decrease. Secondly, even if Andersen's assertion were correct, it would hold true only in the short run. Other firms would be expected to enter the market and offer better value, thus further reducing the profits of the high cost/low value firm in question.

Denis Leonard ("Strong Foundation, Solid Future," p. 30) focuses on the environmental improvement dimension of social responsibility. While often accepted almost tautologically as a given, simply supporting "green" initiatives is not necessarily (and indeed often is not) socially responsible. Analogous to philanthropy, pumping funds into environmental improvement efforts at the expense of employees and shareholders might be far more socially irresponsible. Many green initiatives amount to paying more money to pollute more and do absolutely nothing to improve living conditions for anyone.

In the sidebar "Quality and SR" (p. 34), ASQ Executive Director Paul Borawski quotes Genichi Taguchi: "A good or service demonstrated good quality if its production and use caused little or no harm to society." How does one measure harm? Is harm measured by levels of deadly chemicals in the plant? If so, such a metric is valid.

If harm measurement is based on Al Gore's latest documentary (in which he parades around in an SUV exhorting us to do our part to stop global warming while he pays $31,000 per year in electric bills), then it is incoherent and meaningless. Harm can be whatever corporate actions are no longer en vogue from an environmental perspective as defined by some self-proclaimed elite group.

It would be helpful if we could obtain a stronger foundation for corporate social responsibility and business ethics. This is not simply directed at the March issue of QP. Business schools have a notoriously spotty record in this regard. In any event, firms have responsibilities to their employees and shareholders to conduct business efficiently. Unless they have engaged in theft, they have taken nothing from society. Society should be more thankful for the benefits derived from businesses, rather than demanding unearned payments.

J. Douglas Barrett
Professor of quantitative methods
University of North Alabama

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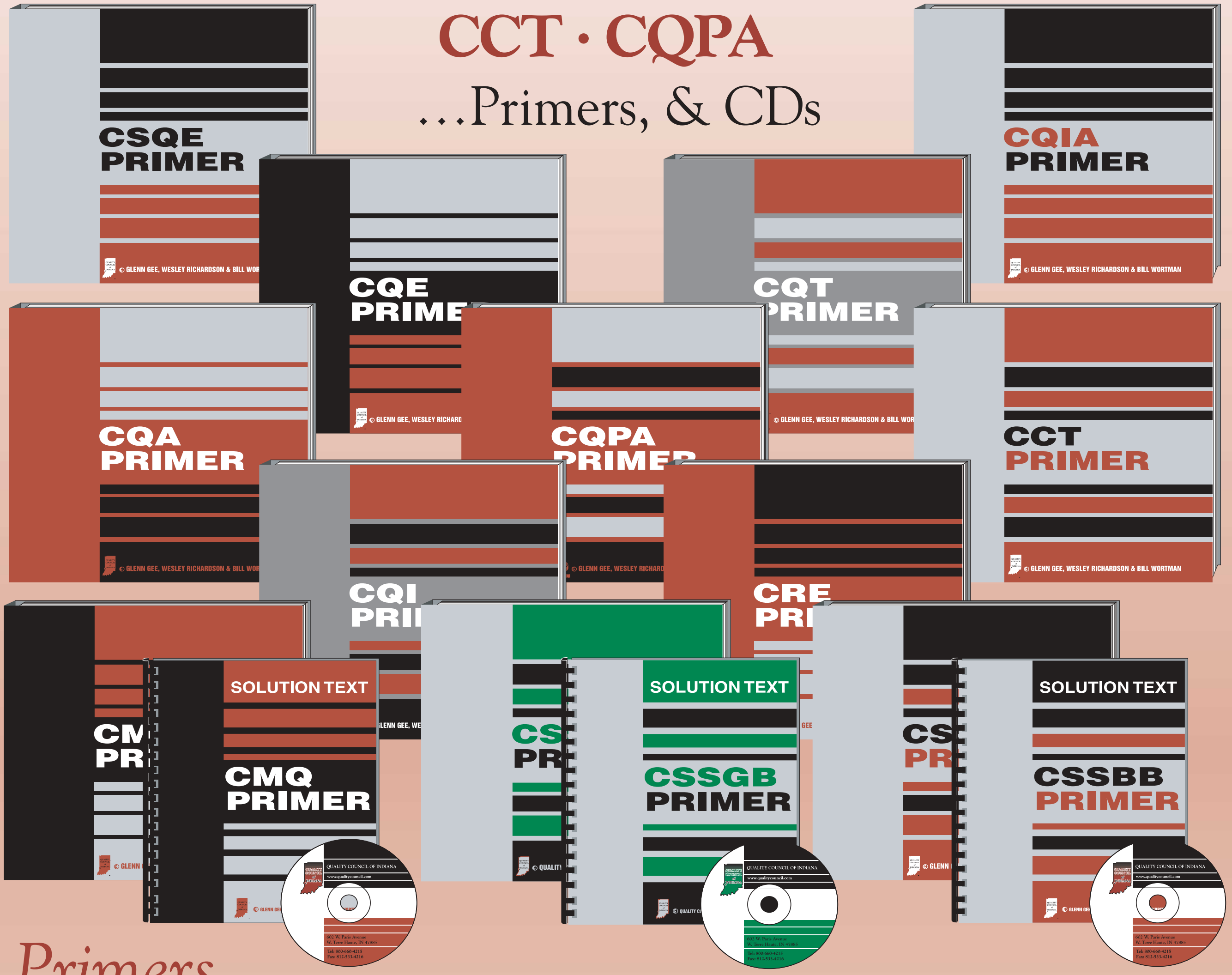

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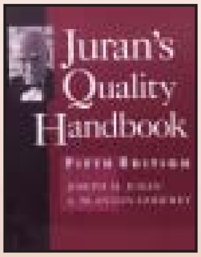

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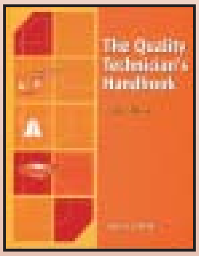

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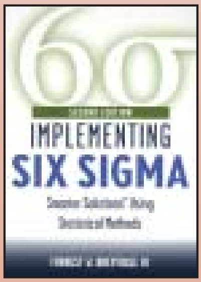

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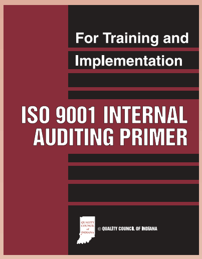

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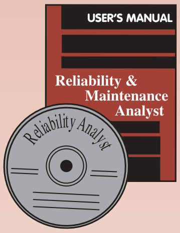

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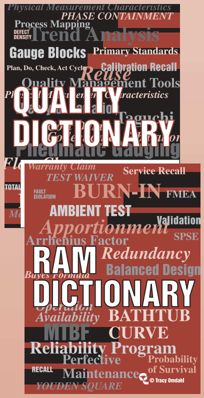

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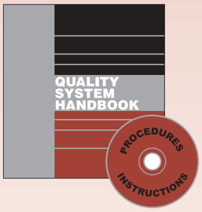
The ISO Primer presents a thorough treatment of the ISO implementation and documentation process. The CD contains generic quality manuals in Word and WordPerfect formats.

Quality System Handbook

By Edenborough



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For Both Book & CD

The QSH details the selection, organization, and writing of quality documents. The disk contains procedures and work instructions. ISO compatible

EXPERTANSWE

COQ in the federal government

Q: I work for one of the largest service delivery organizations in the federal government, providing benefits to almost 55 million people. I have been asked to explore how to measure the total cost of quality (TCOQ) in the government or service sectors. There is a lot of literature about the formula, such as TCOQ = prevention costs + appraisal costs + failure (external and internal), the categories and elements. However, I have not found it applied in the government, healthcare or service sectors. Rather, I get examples such as Six Sigma, lean Sigma, ISO 9000 and the Baldrige award. Are there any local, state or federal governmental organizations (or any sector besides manufacturing) that have attempted to or are currently applying TCOQ methodology, or costing out the four categories?

Carolyn R. Neuwirth
Senior management analyst
Office of quality performance,
division of management analysis
Social Security Administration

A: You have been given a big challenge with an equally big opportunity. Because you work for a very large government agency that does not have a cost of quality program, the opportunity is likely enormous.

You mentioned that you found examples like Six Sigma, lean Sigma and ISO 9000. COQ is part of the body of knowledge for ASQ certified Black Belts. Therefore, agencies that are implementing Six Sigma programs might be starting COQ programs. You might uncover helpful information if you pursue these leads a little further. Implementation of traditional COQ programs within governmental agencies is spotty. There is evidence of implementation at various local facilities such as naval shipyards. Perhaps the most successful implementation is at NASA. A formal COQ program was in place as early as 1964. More recent initiatives include highly sophisticated measures to reduce the COQ in software development.

After reading your question, my hunch is that you are looking for guidance from someone who has already implemented a successful program. His or her insights might help you gain management support and overcome bureaucratic obstacles. However, the nuts and bolts of the program will probably be unique to each agency. After all, quality problems at the Internal Revenue Service are quite different from mistakes within the Social Security Administration.

I suggest you dive in and get started. An excellent source for information is *Principles of Quality Costs: Principles, Implementation, and Use*, third edition, by ASQ's Quality Costs Committee. Published in 1999, it is available from ASQ's Quality Press. You might also want to contact someone on the committee. Some of its members might have first-hand experience implementing a program within a government agency.

It might behoove you to start small. Pick a particular problem, apply the principles, and start collecting data. Your agency serves 55 million people, so it probably processes millions of forms per year. If the form is poorly designed, your agency could spend hundreds of thousands of hours per year processing (or rejecting) forms with errors and omissions. The cost of redesigning the form, printing new forms and retraining your agents will not be trivial, but the cost of perpetuating the errors for years to come is far greater.

Pick a **particular problem,** apply the principles, and **start collecting data.**

Studies have shown that the cost of an external failure can be as much as 100 times the cost of preventing the problem in the first place. As your successes mount, your agency will naturally shift a greater percentage of the budget from correction to prevention, and total costs will decrease. Just how big is this opportunity? Some analysts suggest that the cost of poor quality increases total organizational costs by as much as 20%.

FOR MORE INFORMATION:

"Implementing NASA's Quality Program," Howard M. Weiss, Proceedings of 10th National Symposium on Reliability and Quality Control, January 7-9, 1964, p. 57.

"Developing Risk-Based Financial Analysis Tools and Techniques to Aid IV & V Decision Making," Nancy Eickelman, 2001. www.nasa.gov/centers/ivv/ppt/172489main_Nancy_Eickelmann_Motorola.ppt (case sensitive).

Andy Barnett
Master Black Belt, principle consultant
Quintiles Consulting

Slack factor in CUSUM charts

Q: I have been considering an application for a cumulative sum (CUSUM) chart. I would like to better understand the reason

RS

for the slack factor in the CUSUM statistic. Instead of simply using a cumulative deviation from target, the CUSUM increases or decreases the target by some slack factor (a multiple of the standard deviation). When plotting the hi CUSUM, a higher than actual target is used. When plotting the lo CUSUM, a lower than actual target is used. Why is the slack factor necessary?

Mike Besser
Quality manager
3M Co.

A: The slack factor in a CUSUM chart is not necessary—it is an option. It is used if there is an amount of drift in a process that is considered acceptable. Using a slack factor will keep the chart from giving a signal when you really don't need to react.

For example, if you have a very capable process, one with a high C_p, you might want to allow the mean of the process to shift some from the nominal value. You know, based on your capability studies, there is a very low chance of producing any product outside of specifications even when the process is not centered (your C_{pk} is still high). So you use a slack factor in the CUSUM calculations to prevent the sum from building and showing a signal. You avoid the cost of stopping a process that is producing product acceptable to the customer.

An alternative to CUSUM charting with slack factors is using acceptance control charts (sometimes called modified control charts). With this approach, control limits are calculated inward from the product specification limits, rather than outward from the nominal value. The distance is a function of known short-term process variation. Again, this allows the process mean to shift by an amount that is considered acceptable.

FOR MORE INFORMATION:

Tabular CUSUM Charts at www.micquality.com/six_sigma_glossary/control_charts.htm#13.
CUSUM and EWMA Control Charts at www2.isye.gatech.edu/~jbanks/coursefiles/QCpptFull/Chap08Rev.ppt (case sensitive).
"Building an Acceptance Chart," www.qualitydigest.com/june00/html/accept.html

Peter E. Pylipow
Senior design excellence engineer
Vistakon–Johnson and Johnson Vision Care

No magic number

Q: We are writing our Texas Award for Performance Excellence application. What are some benchmarks regarding training hours for employees?

Karen Holder
Director of HR
Samsill Corp.

A: When asked if there is a standard for training hours, yes, there are historical and anecdotal cases in some companies' quality and improvement journeys' statements of hours. But this leads many to believe there might be some magic number of training hours that will bring about improvement. There is no such thing. The training must focus on building skills and closing the gap from what is to what is needed based on a full analysis of the plan.

The path suggested is as follows:

1. Conduct a job breakdown analysis (JBA). Determine what skills are needed to meet or exceed the necessary requirements for a specific job.
2. Do a needs analysis against the JBA to identify the needs or gaps from the ideal.
3. Plan and deliver the training needed.
4. Assess the effectiveness of the training through post testing or analysis of improvements in performance.
5. Do it again in a year or two as job responsibilities shift around because technology evolves and changes roles and because people move around the organization, which changes the JBA skills analysis.

Many companies, even when doing this type of analysis, want a baseline on overall training. There are two levels:

1. Communicate or get all personnel on the same path with overview classes or introductions to various subjects, such as the legal and statutory training that many of us are required to give (right to know, blood-borne pathogens and introductions to company and culture, for example).
2. The better training option helps employees attain a level of skill needed to benefit the employee's personal success and his or her contributions to the company. It is not an easy path forward. It takes time to do an analysis and identify the real needs. But this is where improvement comes from—the planned, intelligent delivery of skills needed in today's workplace.

John O. Brown
TÜV Rheinland of North America
Senior auditor, ISO 9000:2000
and TS 16949:2002

AN EXPERT'S OPINION

If you would like to reach any of QP's experts, or to pose a question for consideration, visit www.qualityprogress.com and click on the "Expert Answers" department, or e-mail editor@asq.org.

KEEPINGCURRE

HEALTHCARE

Agency Study: Healthcare Quality Up

The quality of healthcare in the United States has improved by 2.3% each year from 1994 to 2005, but the pace of the progress has slowed, according to figures from the Department of Health and Human Services (DHHS).

The average annual rate of improvement declined to 1.5% from 2000 to 2005, according to the Agency for Healthcare Research and Quality's State Snapshots report.

The best performing states across overall measures of healthcare quality—some 149 measures—were Iowa, Minnesota, Nebraska, North Dakota and Wisconsin. The worst performing were Arkansas, the District of Columbia, Georgia, Louisiana and Mississippi.

Visit http://statesnapshots.ahrq.gov/snaps07/index.jsp to access this year's State Snapshots and see a breakdown of each state's scores.

Assessing healthcare quality

In another recent study, most U.S. adults said they believe there are fair and reliable ways to evaluate the quality of healthcare options.

More people are sure about this today than they were two years ago, when the *Wall Street Journal* Online/Harris Interactive Health-Care Poll posed the same question.

This year's poll also found that most U.S. adults favor patient satisfaction surveys over other quality measures, and most are interested in using web based consumer rating tools. For more information on the poll, visit www.harrisinteractive.com/news/allnewsbydate.asp?NewsID=1289 (case sensitive).

Enhanced website

Another DHHS agency recently unveiled a new Hospital Compare website for consumers to review the quality of local hospitals.

The Centers for Medicare and Medicaid Services' website builds on quality information, patient satisfaction surveys and pricing data on specific procedures to help consumers make decisions "about the quality and value of the healthcare available to them through local hospitals," according to a statement prepared by DHHS.

The website, www.hospitalcompare.hhs.gov, uses 26 quality measures and includes 10 topics related to patients' experiences of care to report on the hospitals' performances.

MANUFACTURING

AUTOMAKER DRAWS FROM A VIRTUAL ASSEMBLY LINE

Ford Motors' efforts to design manufacturing processes with digital employees in a virtual assembly plant are paying off, a recent survey has validated.

The automaker has been using virtual tools to test workers' movements on the assembly line for more than eight years to determine the best way things could be built. A recent study by the RDA Group determined Ford's production quality rose by 11% last year, in part because of the virtual tools.

Ford officials said safety increased because the technology helps predict and eliminate on-the-job injuries. Ford also uses advanced motion capture technology and human modeling software to design jobs that are less physically stressful because of ergonomically correct movements and motions.

The virtual manufacturing tool also can be used to validate that an assembly process has been completed, aiding in the quality of the process, company officials said.

ASQ

SOME ASQ DUES TO INCREASE

Some categories of ASQ memberships will increase by a few dollars later this year, the ASQ Board of Directors has announced.

Individual regular, senior and fellow annual dues will go up by $4 to $129. Associate annual dues will increase $2 to $74. New organizational membership dues will increase from $15,000 to $18,000. Changes take effect July 1.

There will be new dues for K-12 district and K-12 school members: K-12 district members will pay $750 and K-12 school members $350. Forum or division, student, sustaining and organizational membership dues will not change.

The board also approved some name changes to the member categories: regular members will be called full members, sustaining members will be called site members, and organizational members will be called either existing enterprise members or new enterprise members. These changes also take effect July 1.

Direct any questions on these changes to mgdteam@asq.org.

HEALTHCARE

Nursing the Demands Of Quality, Patient Care

Nurses' time and energy can be heavily taxed when they're involved in quality improvement initiatives on top of taking care of their patients, a recent study concluded.

More nurses are being pulled into quality improvement projects at hospitals because of their experience in handling day-to-day patient responsibilities, according to the study conducted by the Center for Studying Health System Change. At the same time, nurses are expected to continue their direct patient care responsibilities without missing a beat.

This, coupled with a shortage of nurses, puts extra pressure on hospitals to find the right balance between quality efforts and patient care.

The study, based on interviews with hospital leaders in Detroit, Memphis, TN, Minneapolis-St. Paul and Seattle, does not include any recommendations. The Robert Wood Johnson Foundation commissioned the study "to gain a better understanding of the role that nurses play in quality improvement and the challenges nurses face when balancing the competing priorities."

For more details on the study's findings, visit www.hschange.org/CONTENT/972/ (case sensitive).

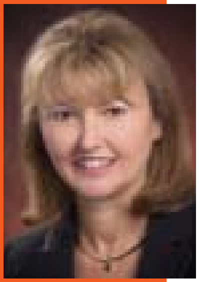
Who's Who in Q

NAME: Marcia Daszko.

RESIDENCE: Santa Clara, CA.

EDUCATION: Master's degree in mass communications from San Jose State University.

CURRENT JOB: President of Marcia Daszko and Associates.



PREVIOUS JOB: Daszko has been involved in corporate communications and marketing. She is a founding board member of the nonprofit organization In2:InThinking Network and a keynote speaker at the Deming Institute's annual conference.

INTRODUCTION TO QUALITY: She was introduced to quality by Perry Gluckman, who would become one of her mentors. Later, W. Edwards Deming became another mentor. She has attended 20 of Deming's four-day seminars. Daszko co-founded the Bay Area Deming User Group, which has become the largest Deming User Group, meeting monthly for 14 years.

ASQ ACTIVITIES: Daszko is a member of ASQ and has spoken at many ASQ conferences and chapter meetings.

OTHER ACTIVITIES/ACHIEVEMENTS: She is a regular keynote speaker on topics such as strategic leadership, transformation and innovation topics. Daszko is also involved in strategic planning and new knowledge facilitation. She is an off-site retreat leader, advisor and executive coach.

PUBLISHED WORKS: Daszko has published numerous articles, research papers and newsletters, and she is currently writing a book.

QUALITY QUOTE: A leader's job is to transform his/her organization. But survival is optional. If leaders do not transform their thinking, their organization might not survive.

KEEPINGCURRENT

ASQNEWS

TRAINING IN MALAYSIA ASQ and Genaxis, a software and training company, together will offer Six Sigma training in Malaysia. The agreement gives Genaxis a license to deliver ASQ training to organizations throughout the Southeast Asian country. Training offerings will include Six Sigma Executive, Champion, Black Belt and Green Belt programs.

HUNTER AWARD Nominations are being accepted for this year's William G. Hunter Award, sponsored by ASQ's Statistics Division. The award promotes accomplishments made during an individual's career in applied statistics. Nominations are due June 30. For more information, visit www.asqstatdiv.org/awards.htm.

SHAININ MEDAL Applications for this year's Dorian Shainin Medal are being accepted by the ASQ Nominating Committee. The medal is awarded for the development and application of creative statistical approaches in problem solving related to product or service quality. To learn more about the medal, visit www.asq.org/about-asq/awards/shainin.html.

BEIJING ROUNDTABLE ASQ and the China Certification and Accreditation Assn. partnered to host an executive roundtable last month in Beijing. The event focused on the value of quality related certifications. Business leaders from the United States and China, as well as Chinese government officials, were scheduled to attend the event.

SHORTRUNS

THE DEPARTMENT OF TRANSPORTATION has announced a new five-star government rating system that will grade child safety seats on how easy they are to install properly. For more on this topic, visit www.nhtsa.gov.

THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) recently delivered its three-year plan for its program to Congress, as required by the America Competes Act passed in August 2007. NIST says the document provides a framework that allows it the flexibility to address immediate national needs, such as voting standards and technology, and IT security. The plan is available at www.nist.gov/director/reports/Final_NIST_3y.pdf (case sensitive).

THE ASSN. FOR MANUFACTURING EXCELLENCE will recognize an organization that uses advanced manufacturing techniques when it presents its Manufacturing Excellence Award at its annual conference. The deadline to apply for the award is June 1. The conference is slated for Oct. 20-24 in Toronto. For details about the award and conference, go to www.ame.org.

DESPITE A DECADE OF IMPORT GROWTH and job loss, the U.S. manufacturing sector remains a vital part of the nation's economy, according to a recent report by the Economic Policy Institute. Manufacturing supported 14 million jobs last year, or about 10.1% of total employment. The Washington, DC, based think tank also reported that manufacturing industries make up a large share of U.S. economic production, generating a gross domestic product of $1.6 trillion in 2006. Visit www.epi.org/content.cfm/webfeatures_snapshots_20080212 to see more of the report.

AFTER FIVE YEARS, the ISO secretary-general is stepping down from the position. Alan Bryden told the ISO Council he will be available to assist in the search for a successor. The council said it hopes to have a successor in place for the first quarter of 2009.

ASQ'S SERVICE QUALITY DIVISION is accepting applications for the annual A.C. Rosander scholarship award for the 2008-2009 academic year. The scholarship is open to eligible members of the Service Quality Division and their family members. The number of scholarships and the amount awarded is determined each year based on the number of applicants. Applicants must be enrolled at an accredited university. Applications, which include an essay, are due June 2. For an application, visit www.asq.org/service/scholarship/index.html.

A NEW REPORT from the National Institute of Standards and Technology identifies the R&D priorities of three critical high-tech U.S. manufacturing areas: hydrogen energy technologies, nanomanufacturing, and intelligent and integrated manufacturing. The three areas are cited as being important to U.S. economic and national security. For more details on "Manufacturing the Future: Federal Priorities for Manufacturing R&D," visit www.nist.gov/public_affairs/releases/manufacturing.html.

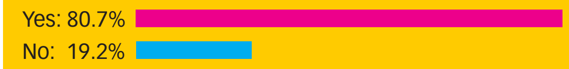
THE UNIVERSITY OF SAN DIEGO is offering a web based master's degree in supply management, the first such program to be approved by the Institute for Supply Management. The program for professionals currently working in the field takes 26 months to complete and includes three face-to-face sessions a year to supplement online interactions. Visit www.ism.ws/about/mediaroom/newsreleasedetail.cfm?itemnumber=17775 for more details.

ONLINEONPAPER

QUICK POLL RESULTS

Each month at www.qualityprogress.com, readers can take a short, informal survey, and we post the results. Here are the numbers from a recent Quick Poll:

"Should practicing social responsibility and environmental sustainability be considered part of quality management?"



Visit www.qualityprogress.com to answer the most recent Quick Poll question recently posted:

"What ill effects has your company experienced as a result of the sluggish economy?"

MOST POPULAR

QP's website tallies the number of visitors and the hits each story receives. The following is a recent ranking of the most popular articles found at www.qualityprogress.com.

- "Architect of Quality," by Mark Edmund.
- "Quality in the First Person" column: "A Perfect Corrective Action," by Jim Franklin.
- "One Good Idea" column: "Rapid Brainstorming Brings a Deluge of Ideas," by John Lynch.
- "2007 Salary Survey," by Hank Lindborg and QP staff.
- "10 Quality Basics," by many contributing authors.

DATEINQUALITYHISTORY

QP looks back on an event or person that made a difference in the history of quality.

May 1, 1946

The Union of Japanese Scientists and Engineers (JUSE) was established to promote the "systematic studies needed for the advancement of science and technology." The Japanese government encouraged JUSE's formation to help the country recover from World War II. JUSE connected leaders and experts of large industries to share best practices.

JUSE brought two notable leaders of quality to lecture in Japan in the early 1950s, W. Edwards Deming and Joseph M. Juran. Many consider their visits to be the start of a quality movement that made Japan a quality and economic powerhouse in the late 20th century.

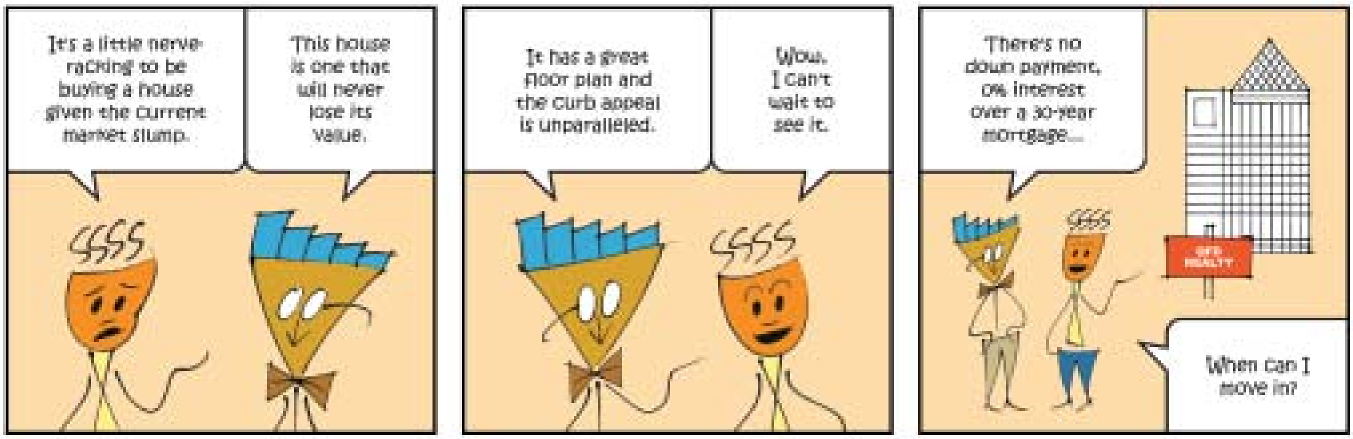
Ichiro Ishikawa was one of JUSE's founders. His son, Kaoru Ishikawa, later led JUSE and encouraged the organization to internalize the teachings of Deming and Juran. Kaoru Ishikawa is considered a leader of the Japanese quality revolution.

JUSE also is known for awarding the Deming Prize, considered one of the world's most prestigious quality awards. First awarded in 1951, these medals commemorate Deming's contribution in promoting quality concepts.

Sources: Free Quality, www.freequality.org, and the Union of Japanese Scientists and Engineers, www.juse.or.jp/e/.

Mr. Pareto Head

BY MIKE CROSSEN


It's a little nerve-racking to be buying a house given the current market slump.
This house is one that will never lose its value.
It has a great floor plan and the curb appeal is unparalleled.
Wow. I can't wait to see it.
There's no down payment, 0% interest over a 30-year mortgage…
QPS REALTY
When can I move in?

*Special thanks to ASQ member Claudio Gatozzi

ASQ

ASQ Plans Global Transformation Initiative

ASQ is poised to roll out a global transformation initiative designed to create a unified presence for the organization and its members throughout the world.

Pending approval this month by the Board of Directors, ASQ will advance its organizational structure and operations to make it easier for members to learn about and share quality management systems, tools and practices across international borders.

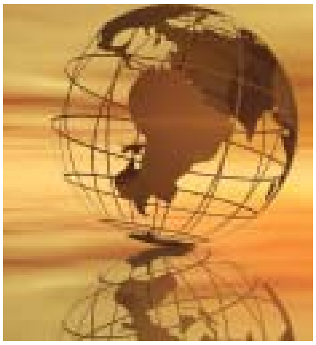
If the proposal is approved, ASQ will begin to respond to growing membership and demands for products and services locally in five key markets:

- **China and India**—ASQ already operates offices and employs full-time staff in these countries, and ASQ will accelerate efforts there to increase its presence.
- **Mexico, Brazil and South Korea**—More research and planning will be done to establish an ASQ presence in these countries.

Since 1996, ASQ has steadily expanded its global efforts and offerings to meet the growing needs of members throughout the world. Today, ASQ supports members in 120 countries. Training is offered in cities worldwide and in multiple languages. Certifications are translated and administered around the globe.

Response to global membership

In recent years, as more companies expanded globally and more quality professionals looked for local ASQ involvement and services, the society formed an International Transformation Task Force to map out a global transformation plan. The plan is intended to accelerate the organization's ability to respond to member demands and attract new members.



"We really needed to recognize that our global membership is growing and will continue to grow outside the United States," said ASQ President Mike Nichols.

ASQ's intent with this transformation is to better reflect and support the global organizations in which members work, the places where they live and the communities they serve. The evolution also will strengthen ASQ relationships with multinational businesses that seek benefits for their employees, suppliers and customers worldwide.

Board action

The board will review and consider the opportunities and plan, which will address issues such as certifications, learning offerings, community growth, web access and services, and standards.

The task force is expected to recommend a plan to enhance and expand member offerings beginning in July, and initial steps will be adapted and expanded based on needs and opportunities during a three to five-year period.

For more information about the initiative, visit www.asq.org/members/gti/index.html. To submit comments, visit www.asq.org/mr/intl-task-force.html. —*Nicole Adrian, contributing editor*

9

THE NUMBER OF organizations that received the Shingo Prize for Operational Excellence at a conference and awards ceremony in Dallas recently.

Business prize recipients were Baxter International, Cartago, Costa Rica; Carestream Health Inc., Guadalajara, Mexico; Kemet Electronics, Matamoros, Mexico; Kemet Electronics, Victoria, Mexico; Metalworks/Great Openings, Ludington, MI; and ZF Lemforder Corp., Tuscaloosa, AL.

Silver medallion recipients were Global Engine Manufacturing Alliance LLC, Dundee, MI; Lockheed Martin Missiles and Fire Control-Camden Operations, Camden, AR; and Raytheon Integrated Defense Systems, Andover, MA.

Organizations receiving the bronze medallion were Carestream Health Colorado, Converting Operation, Windsor, CO; Delphi Steering, Prototype Operations, Saginaw, MI; and Raytheon Missile Systems, Camden, AR.

Research prize recipients were Jerry Solomon and Rosemary Fullerton for *Accounting for World Class Operations* (WCM Associates, 2007); Jean Cunningham and Duane Jones, *Easier, Simpler Faster—Systems Strategy for Lean IT* (Productivity Press, 2007); Pascal Dennis for *Getting the Right Things Done* (Lean Enterprise Institute, 2006); Allen Ward for *Lean Product and Process Development* (Lean Enterprise Institute, 2007); Matthew May for *The Elegant Solution* (Simon and Schuster, 2006); and Mike Martyn and Brad Parker, *Applying TWI to Retail Sales* (Training Within Industry program).

Information on the revised Shingo Prize model and guidelines can be found at www.shingoprize.org.

WEBWATCH

This month's Web Watch focuses on product safety. For more quality related websites, visit www.asq.org.

www.astm.org

While ISO 9001 can be used to develop quality management systems for toy manufacturing, ASTM International is the publisher of most of the product standards on toy safety, including ASTM F734-84, which focuses on risk based safety assessments. Using the word "toy," the site's search engine can lead visitors to information and news items about these standards.

www.asse.org

The American Society of Safety Engineers' (ASSE's) website has resources for members and nonmembers. Nonmembers can find information on the annual manufacturing safety symposium, a newsroom, a schedule of training opportunities, book reviews and limited access to ASSE publications. Full access to publications is allowed only to members. Membership requires a fee and certain levels of education and experience.

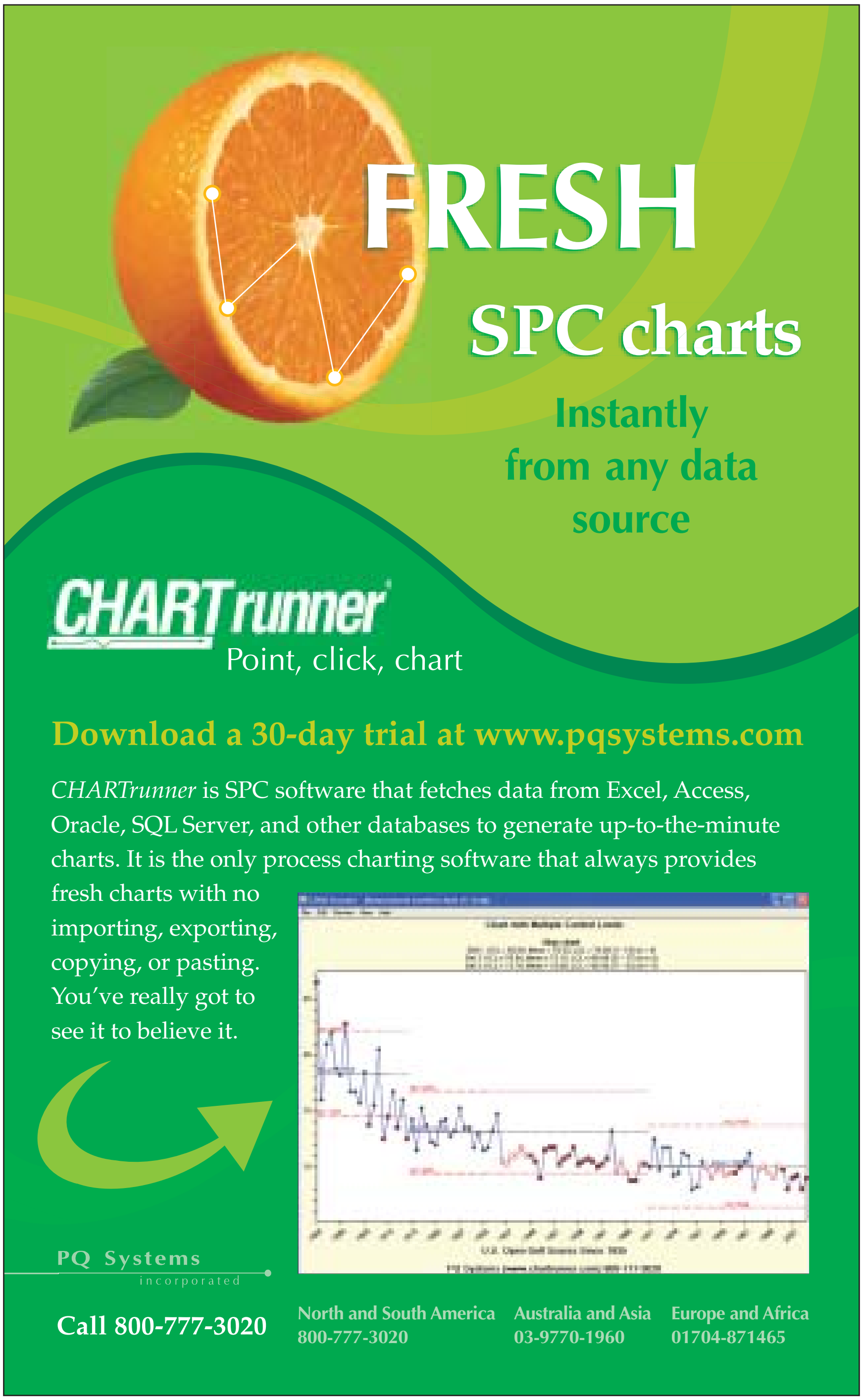
www.cemarking.net

CE Marking is a mandatory safety approval for certain European products, including machinery, electrical equipment, toys, gas appliances and medical devices. This site is full of information on CE Marking for consumers and manufacturers. The most prominent feature is a complete guide of CE Marking regulations and directives. Using either the search engine or the CE directive wizard, users can read the full texts of all the directives.

www.esrahomepage.org

The European Safety and Reliability Assn. (ESRA) is a nonprofit umbrella organization with a membership consisting of national professional societies, industrial organizations and higher education institutions. ESRA's website has information on becoming a member, conference listings, safety and reliability links, and electronic copies of the ESRA newsletter.

FOUND AN INTERESTING QUALITY SITE? If you come across a noncommercial site that could be useful to other quality professionals, e-mail it to medmund@asq.org.



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CHARTrunner is SPC software that fetches data from Excel, Access, Oracle, SQL Server, and other databases to generate up-to-the-minute charts. It is the only process charting software that always provides fresh charts with no importing, exporting, copying, or pasting. You've really got to see it to believe it.

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It All Ties Together

CSX team's project curtails fuel consumption, saves company millions

by Nicole Adrian, contributing editor

In 50 Words Or Less

- A team from the rail company CSX Corp. found idling locomotives wasted 30 million gallons of diesel per year.
- Team members used quality tools, such as Six Sigma and FMEA, to reveal root causes and develop fuel conserving solutions.
- The result: a savings of more than $28 million over three years.

AT A TIME when fuel prices have skyrocketed and companies across the board are doing their part to be greener, a team of individuals from CSX Corp. came together to reduce the large amount of fuel wasted while locomotives sat idling.

The locomotive shutdown team used a variety of quality tools and methods and ultimately came up with a solution to increase shutdown time and decrease the temperature at which locomotives could be shut down. The project saved millions of dollars in the form of millions of gallons of diesel fuel.

The team's work earned it a bronze medal at the 2007 International Team Excellence Competition, sponsored by ASQ's Team and Workplace Excellence Forum. The team presentations are judged annually at ASQ's World Conference on Quality and Improvement.

War on waste

CSX locomotives were typically left idling when not in use, even for relatively short periods of time. Idling locomotives wasted four gallons of fuel per hour. But if the shutdown occurred for too long a period, gaskets would dry out, causing engine leaks.

In 2004, the locomotive shutdown project was created out of a CSX Six Sigma process improvement team (PIT+) that focused on fuel. PIT+ teams created at this time were to look at all business processes and major cost areas. The project arose out of organizational needs, using a top-down approach that focused on waste elimination based on data and broad stakeholder involvement.

Fuel made up nearly 10% of total operating expenses, and fuel prices were expected to increase in the coming years. The fuel PIT+ developed a value driver tree to focus in on high impact areas that could be rapidly implemented.

To figure out if a fuel conservation project was worth attacking, the team tapped into data that was used for exception reporting on locomotive dwell times (see Figure 1). The median time a locomotive didn't move was 12 hours on a weekday and 14 to 16 hours on the weekend. About 3,600 locomotives were in transit at any given time.

The team found that the idling locomotives wasted 30 million gallons per year. Armed with these numbers and data, the team decided the project was worth tackling.

Getting involved

Potential stakeholders in the locomotive shutdown project participated in the effort to define and launch the project, each bringing valuable perspectives, insights and concerns. The team validated the project stakeholder perspective by using suppliers, inputs, process step, outputs and customers (SIPOC), and included the suppliers and customers as stakeholders.

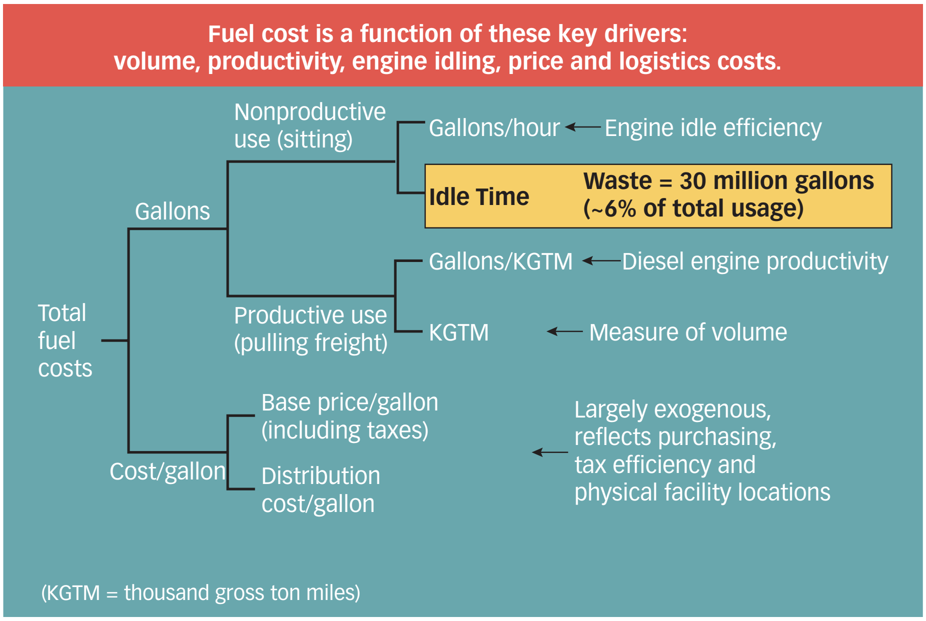
Ultimately, the project involved stakeholders across various work areas (see Table 1). This included employees and people from:

- The senior leadership team (SLT).
- Locomotive management and shop.
- Transportation management, and train and engine departments.
- Finance and purchasing.
- Environmental group.
- Communities served.

In the beginning, the SLT and project champion addressed resistance, allocated resources and ensured project goals cascaded through the organization. The finance and purchasing stakeholders tracked and validated savings, ensuring that budgeting activity reflected the project's success. Tying in the budget process further committed functional departments to the project.

Employees who managed and worked in locomotive shops and service centers agreed with the project's aim but had concerns. Employees reasoned that if the locomotives did not restart easily and needed assistance, it could hurt their facility throughput and pull resources away

Reasons this project was selected / FIGURE 1


Fuel cost is a function of these key drivers:
volume, productivity, engine idling, price and logistics costs.
Total fuel costs
Gallons
Nonproductive use (sitting)
Gallons/hour
Engine idle efficiency
Idle Time
Waste = 30 million gallons (~6% of total usage)
Productive use (pulling freight)
Gallons/KGTM
Diesel engine productivity
KGTM
Measure of volume
Cost/gallon
Base price/gallon (including taxes)
Distribution cost/gallon
Largely exogenous, reflects purchasing, tax efficiency and physical facility locations
(KGTM = thousand gross ton miles)

Stakeholder involvement / TABLE 1

Stakeholder roles, involvement and impact of contribution to root cause analysis

Who:	Role:	Responsibility:	Impact:
SLT and Champion	Secure resources.	Monthly champion reviews and oversight.	Low
Locomotive management and shop employees	Locomotive Engineering support.	Validate improper shutdowns.	High
Transportation management and T&E employees	Advise on issues perceived by end users.	Evaluate failures. Identify exceptions for missed opportunities.	High
Finance and purchasing	Finance/budget analysis.	Not process owners. Provide cost per gallon.	Medium
Environment/ communities served	Help identify "other" occasions of shutdown opportunity.	Support through idea generation.	Low
Black Belt support	Data analysis.	Perception on process variation. Effectiveness of current controls.	High

Levels of Impact:
Low = support role
Medium = validation
High = SMEs

from their primary tasks.

The transportation management and train and engine employees also had concerns. These included:

- Yard delays caused by restarting locomotives.
- Initial start-up taking more time than it would have with idling locomotive waiting.
- Locomotives shut down for a short period of time.
- Lack of locomotive maintenance assistance at outlying areas.
- A lapse in production.
- Poor service to customers.

To be successful, the team needed to maintain and leverage the support of the SLT while increasing support from the locomotive shop and service center employees, and the train and engine personnel. The team also needed them to change their behavior. To understand the degree of impact the project would have on stakeholders and the reasons behind potential resistance, the team used failure mode effects analysis (FMEA).

The environmental group was an obvious project supporter. The group envisioned fewer noise and air pollution complaints from the communities CSX serves. The environmental group had received complaints from residents, who said the idling locomotives disturbed their sleep. The residents also had concerns about diesel fumes. The group also saw the opportunity to gain emission reduction credits.

Choosing the mission

To select the project, the team used familiar tools: Six Sigma and define, measure, analyze, improve and control (DMAIC).

Project selection also included some considerations and measures:

- Data availability and quality.
- Projected benefits and savings.
- Impact on internal and external customers.
- Impact on existing initiatives.
- Locomotive idle time in hours.
- Gallons per hour consumed while idling.
- Historical total idle time.

The team used various tools to assess the type of impact the project could have on stakeholders and all units involved. These tools included:

- Subject matter expert (SME) input.
- FMEA.
- Change acceleration process tools.

- Driver trees.
- Analytical tools.

The team found that 78% of the locomotive fleet is equipped with a global positioning system (GPS), which generates an automated transmission each hour, providing information about the status of the locomotive and whether it has moved since the last transmission.

To gauge the shutdown performance and to measure the project's impact and value, team members used information about the locomotive's identification, latitude and longitude of reporting, hours since last movement and if the locomotive was running or shut down.

SMEs provided insights into the potential root causes that stemmed from the FMEA. These ideas included:

- Employee knowledge and attitude.
- Current and expected ambient temperature.
- Dwell or sitting time of locomotive.
- Actionable opportunities.
- Applicable rules regarding when to shut down.
- Health of locomotive.

A questionnaire was then sent to all engineers to serve as a fuel shutdown reminder and affirmation, and to gain their feedback and ideas. For the project to succeed, it had to affect the behavior of more than 8,000 employees in hundreds of locations throughout the eastern half of the country.

Root cause analysis

The team again used FMEA to identify issues of critical importance to the stakeholders and to view the issues in context with all stakeholder involvement. Additionally, the team worked through a cause and effect matrix to validate the insights from FMEA, relate the inputs to customer requirements and prioritize potential root causes. While team members developed SME insights from cause and effect diagrams and FMEA, they also investigated hard data, the GPS data from the locomotive fleet and other sources to confirm SME insights.

The identification and analysis of root causes started with subjective insights followed by data collection and analysis. The facts led to team agreement. The process involved a wide variety of tools based on the type of information and data available, which also created a common perspective and commitment within the team.

These tools included:

- Process maps.
- FMEA.
- Cause and effect diagrams.

AN INSIDER'S VIEW

I've worked for CSX Corp. for 34 years, and my father and brother worked on the railroad. Railroading is in my blood, and I know this industry very well. I realize because of its 180-year history, there is a lot of tradition that can sometimes mean slow-moving processes and resistance to change.

This changed at CSX when the company got involved with Six Sigma and ASQ. From the start, I could easily see how the Six Sigma process tore down the walls that prevented our growth. Being involved with the locomotive shutdown project is a perfect example of how this process works at CSX and how it made me see that we were changing for the better.

As one of the 32 finalists, our team was filled with pride. To be included with some of the world's corporate leaders—companies such as Boeing, Siemens and Genentech—was mind-boggling. This was the first time CSX was in the finals. When we marched into the meeting with the other finalists, and as the streamers were flying and the cheering crowd was using noisemakers, it was hard to contain our excitement.

> "After generations of doing things the same way, **this was quite an amazing accomplishment.** Railroaders are full of a sense of pride in their work because for nearly two centuries we've run trains."

I remember that when it was announced that our team was the bronze winner, we launched from our seats and ran onto the stage, leaping and screaming with excitement. I think my teammates would agree that we didn't feel this excitement just for ourselves. We were accepting this coveted award for the entire CSX Corp., and the employees who embraced this new way of working. After generations of doing things the same way, this was quite an amazing accomplishment.

Railroaders are full of a sense of pride in their work because for nearly two centuries we've run trains. Now, with this sort of process improvement, we don't just run trains—we run them well. This is the sort of forward thinking that future generations of railroaders will use to ensure that, indeed, CSX is how tomorrow moves. *— Dennis Merrell, core team member*

- Questionnaire/survey.
- Measurement system analysis.
- Statistical tests.
- Team agreement on results.

Following the rules

The team found that locomotives were often left idling because operators were simply following the company's rules. Before this project began, the CSX transportation fuel conversation rule was to shut down diesel locomotive engines when they were not being used for at least 30 minutes, and the ambient temperature was above 40° F.

To develop possible solutions, the team benchmarked other railroad shutdown practices—including those of Burlington North Santa Fe Corp. and Canadian National—to determine what risk levels railroad operators accepted. They discovered these other railroads supported lower temperatures and time thresholds.

The team's solution tree identified several factors that had statistical significance to shutdown performance—most were constrained by the fuel conservation rule. The data showed clear differences in performance by location. It was also clear that shutdown performance was impacted by temperature. Regression results on a fitted line plot gave the team clues that individuals had different interpretations of the temperature.

A final solution

The team considered changing the rule's time and temperature limits, which would result in increased employee awareness, rule adherence and standardization of the delivery system of temperature information. The team used an improved FMEA to gauge the solution's potential value.

To understand the risk of increasing shutdown opportunities by adjusting the parameters of the rule, the team collected data from temperature gages installed in the water system on a sample of units in colder weather. Each of the units had a dump valve installed so the engine cooling water would automatically drain when it reached 40° F, preventing any possible freeze damage.

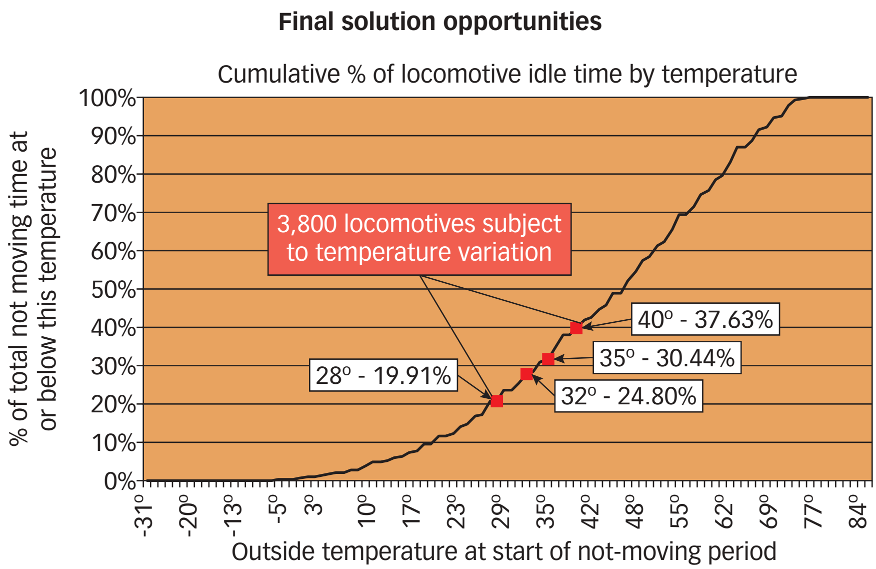
TEAM MEMBERS WHO represented the CSX group at the 2007 International Team Competition were (from left) Andy John, Herb Schubert, Wayne Sequin, Dean Menefee, John Murphy and Dennis Merrell.

These samples indicated:

- At 28° F ambient temperature, it should take 32 hours for water temperature to reach 40° F.
- At 28° F ambient temperature, it should take 52 hours for the water temperature to reach freezing.

However, each locomotive had a different heat transfer rate—the data on two of the units indicated the water would reach 40° F in as little as 14 hours

Final solution validation / FIGURE 2



> The team found **idling locomotives** wasted **30 million gallons of fuel per year.**

and begin freezing at 25 hours. The data showed that CSX can tolerate risk at 35° F for shutdown without unusual risk of locomotive engine and components damage. At 35° F ambient temperature, locomotive cooling water will never reach freezing.

After analyzing the data, the team concluded it would support two rule changes (see Figure 2, p. 25). First, at selected locomotive shops and service centers that were manned 24/7, the shutdown temperature threshold would be decreased from 40° to 28° F. Second, the temperature in the rule would be decreased from 40° to 35° F, and the time would be decreased from 30 minutes to 15. These changes were based on benchmarking and validated by temperature decay regressions. The rules were applied in September 2004.

Making changes

After the rules were put into practice, large, obvious signs were built at locomotive shops to reinforce when to shut down locomotives and when to leave them running. Daily scorecards for each location and division were and continue to be used to provide responsible field officers with current, relevant and actionable data.

Each 1% change in shutdown performance generates more than a half million gallons of fuel annually,

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equaling more than $1 million in savings for each percentage point.

Some of the tangible and intangible results realized include:

- Improvements to shutdown performance numbers without collateral damage for operations' mechanical and transportation management.
- A savings of $3.6 million in 2004.
- Additional savings at specific shop locations.
- Train origins that were not impacted.
- Improved fuel efficiency at a time when fuel costs were escalating.
- An invitation to join the Environmental Protection Agency's greenhouse gas initiative.
- A savings of more than 14 million gallons of fuel and more than $28 million over the three-year span of the project.
- Better stewardship with regard to the environment resources by reducing emissions and noise, which has led to happier neighbors and recognition for the achievements.
- A savings of more than 650,000 barrels of a nonrenewable fuel resource.

Beyond these results for CSX, the locomotive shutdown team had results of its own. Over the course of the project, the team members increased their familiarity and understanding of process improvement tools and the workforce developed more disciplined behavior. Several key members were identified for performance and received awards.

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Better Safe Than Sorry

Look inward, not just overseas, to prevent product safety mishaps

by Randall L. Goodden

In 50 Words Or Less

- The product recalls of 2007 weren't just the result of out-of-control overseas suppliers.
- Many problems originated in the product design stage before suppliers got involved.
- Companies must analyze hazards and risks associated with developing and releasing products, but many aren't informed or don't fully comprehend this specialized area.

LAST YEAR'S RECORD number of product recalls, especially recalls of children's toys, drew worldwide attention to product safety and defective products. The recall stories topped newscasts and made headlines in newspapers coast to coast. Recall concerns quickly spread through Europe, Australia, Canada, Malaysia, Japan and elsewhere. By year's end, concern for product safety and import control had become a serious concern around the globe.

WARNING
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ON DUTY

In the United States, the Consumer Product Safety Commission (CPSC) spearheaded 473 recalls involving 110 million products in 2007, the largest number of recalls in 10 years.[1] Although media attention focused on children's toys and "Made in China" labels (especially around the Christmas season), recalled toys actually amounted to less than half the total consumer products recalled by the CPSC.[2] Even though other product types were recalled more often—household, outdoor, sports and recreational, and specialty items—nothing drew as much attention as the toy recalls.

With the toy recalls, the CPSC issued warnings about potential hazards of lead paint, choking, swallowing, cuts and strangulation. For the recalled household products, the CPSC was concerned about fire, shock, burn and carbon monoxide poisoning hazards. The various sports and recreational products were recalled because of hazards related to falls, fires, burning, drowning and loss of control.[3]

In addition to the 473 CPSC warnings, there were countless other recalls in 2007:

- Nearly 400 drug, food and pet food recalls handled by the Food and Drug Administration.
- Millions of pounds of beef and other food products recalled by the Department of Agriculture.
- Almost 600 motor vehicle related recalls handled by the National Highway Traffic Safety Administration.
- Miscellaneous recalls issued by the Environmental Protection Agency, the U.S. Coast Guard and other commercial companies not controlled or recorded by government agencies.

Some manufacturers received substantial fines for their defective products. In fact, the CPSC issued $2.75 million worth of fines and penalties to companies for failure to initially report a hazardous condition.[4]

PRODUCT SAFETY, LIABILITY PROTECTION

Product safety and liability prevention involve more than just warning labels, defective designs and engineering concerns. It involves many areas of business and many, if not all, areas of management. To effectively limit the possibility of problems, everyone needs to understand what a company could face.

Contracts and agreements: Does your company have sound contracts and agreements in place to help limit its potential exposure to product liability? These could be between your company and suppliers, dealers, manufacturing reps, service companies or even their customers. Remember, if there aren't safeguards to shield your company from a negligent supplier of a component part, you could be in store for the same amount of trouble as you would have had the component originated with your company.

Product design reviews: The design review is the first critical step in a product's life cycle and the least expensive time to recognize a potential problem and make changes. After all, design defects can be far more devastating than manufacturing defects. Do you have design review and product safety teams that review all new products to ensure quality, reliability and manufacturability? Do the teams ensure the product will be dependable, safe and reliable, not only for its intended use and application, but also in cases of foreseeable misuse? Do the teams generate meeting minutes?

> “**Do your people know what to do** if the testing produces **unfavorable results?**”

Product safety reviews: Does the company maintain a well-trained product safety team to handle the hazard analysis and risk assessments of all new products developed?

Marketing and advertising concerns: It isn't just defective products that could lead to troubles, but the things you say to promote a product. For instance, images shown in promotional videos, brochures or packaging might send a specific message and could lead to a product liability lawsuit. Sales and marketing can sometimes push the envelope when promoting a product by overstating its features, benefits or capabilities. Do you know what such liabilities are, and what words and things to avoid?

Reliability testing: Does your company routinely test new products to ensure they're safe and reliable? Some companies lost major cases recently because of a lack of adequate testing. Even with such testing, do your people know what to do if the testing produces unfavorable results?

Warning labels and instructions: There are international standards for warning label design, as well as instructions. Are your engineers familiar with them? Are the labels and instructions you're using in compliance with

Exposure to **product liability** shouldn't rest with just the **engineering group.**

Some manufacturers—vitamin maker Leiner Health Products, Topps Meats and Foreign Tire Sales—were so overwhelmed by the recall expense that they went out of business or sought bankruptcy protection.[5]

Assigning blame

The vast amount of media attention pointed the finger at Chinese manufacturers as the culprits behind the defective products that were discovered in stores throughout the United States.

Most of the recalled products were made in China (the country in which 80% of toys and 40% of all consumer products that end up in the United States are produced), and Chinese manufacturers were largely at fault for the lead paint defect. But this defect represented less than half of the recalls involving children's products made in China.[6]

This brings to light some problems associated with overseas suppliers and the associated economies. Purchasing products or materials from untested or unproven suppliers in places such as China or India isn't the same as doing business with established suppliers in places such as Europe. For instance, depending on the supplier, if products are either defective or result

these known standards?

Records retention programs: Records will become critical to your defense in a product liability lawsuit. The court will demand many types of records in a short timeframe. Do you have a sound records retention program?

Document control: Once you produce the records demanded by the court, what would these documents say? Many product liability cases are lost and punitive damages awarded because the plaintiff can prove through the company's own records that it had prior knowledge of a problem or defective condition and failed to react in a responsible manner. Do you and your employees understand what could constitute a dangerous document?

Supplier selection and control: If your supplier manufactures faulty components, your company could be in as much trouble as it would have been had it made the components. Without proper safeguards, the company and supplier could be sued, even though the company might have been supplied defective components. From a legal perspective, the more companies a plaintiff can name and sue in a lawsuit, the merrier—especially companies with deep pockets. Do you have adequate indemnification clauses in place? Do some of your smaller suppliers and subcontractors carry liability insurance? Does anyone in your purchasing group even ask?

Warranties: All products come with some sort of warranty, but does your sales and management team know the difference between full and limited warranties or express and implied warranties? That nicely printed warranty form might not be the only warranty you're going to be bound to, and your sales and management team probably doesn't even know it.

Recall procedures: Never wait for a disaster to determine how to initiate a recall. Are you recall ready? There are numerous ways to handle a potential recall or a field problem. If you're manufacturing consumer products, there are other reporting requirements you must follow or you could face substantial fines. Do you have procedures for your management team to follow? Do you know who would be in control? Does that individual know the ways and means of conducting a recall, or are outside resources available?

Incident reports: Most product liability cases start as an incident being reported and grow to become lawsuits. Do your employees know how to handle such a notification of an incident? Do they know whom to contact in your company when they're made aware of a field incident, or do they just try to handle it themselves?

Accident investigation: If you investigate an accident or incident right from the start, you could successfully prevent a lawsuit and possibly get the other party to drop the issue altogether. If you have the tendency to just forward everything to your insurance company for it to handle, it is almost guaranteed you're going to take a loss. —*R.G.*

in injury or lawsuits and must be recalled from the market, the company that brought the products into the United States will bear all the costs and liabilities, regardless of any contractual agreements that might have been written.

The only protection for the U.S. importer is to require its overseas suppliers to hold insurance with an American international insurance company to cover any potential problems. Beyond that, U.S. retailers or manufacturers buying products from overseas suppliers must have a presence at those plants to ensure the product is being made to exact specifications.

Beyond just suppliers and lead paint

The majority of "Made in China" recalls were due to reasons other than lead paint. Defective designs were typically the fault of the companies that originally created the specifications and ordered the products from China and were not the fault of the Chinese companies contracted to manufacture the products.

This is part of a problem that plagues many manufacturers, not only across the United States, but also around the world:

- Design and engineering departments develop new products that contain design defects or safety hazards because they lack knowledge and training in the areas of hazard analysis and risk assessment.
- Unaware that the actual design might already be defective, quality departments step in and ensure the products are consistently made per specifications.

The concerted effort can eventually lead to massive recalls and product liability lawsuits.

Typically, most corporations believe they hold an above average knowledge of product safety issues and requirements, and their employees know what's best to prevent such product safety issues from surfacing. Often, these optimistic beliefs fall well short of reality.

In many instances, the companies don't even hold formal design reviews for their new products or conduct a thorough analysis by a product safety team. At best, the designer or engineer of record performs a biased failure mode effects analysis, which only scratches the surface.

Last year's recalls weren't just a supply chain problem. They were the result of the primary corporation failing in one of the following areas:

- Design reviews and product development.
- Product safety and hazards analysis efforts.
- Product testing.
- Supplier selection, inspection and control.
- In-process quality control.

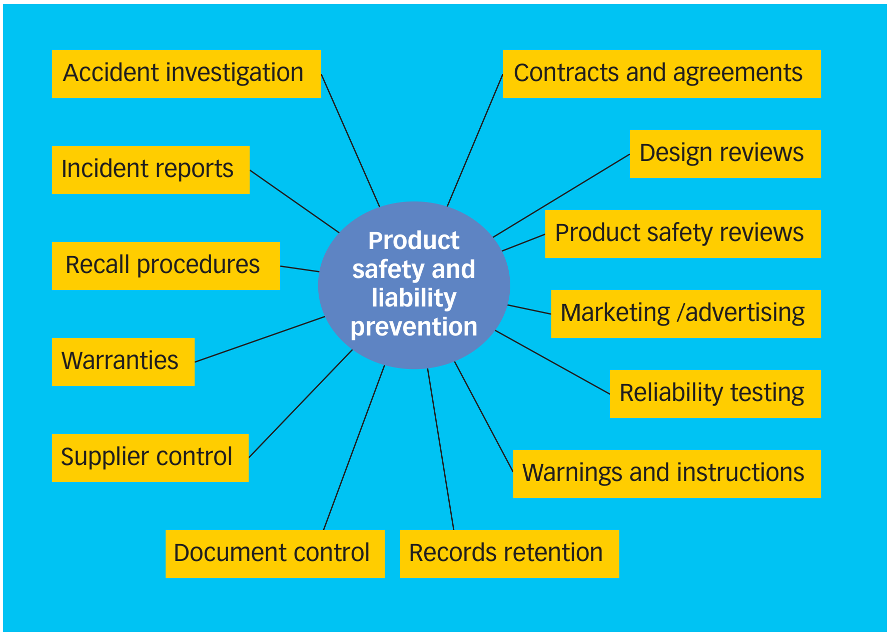
Product safety and liability prevention is considered a specialized field that requires training to understand, and it encompasses a large number of concerns that touch many departments in a corporation. This prevention requires an entire management team, not just the engineering group, to understand the ramifications.

Every company is susceptible

Whether it's a commercial, industrial or consumer product, or a large or small manufacturer, there's high potential risk with every new product launch. It's surprising how ill-prepared many manufacturers can be in this area.

The size of the company is no indication of the level of knowledge or expertise on product safety and liability prevention in the company. You would assume this lack of expertise would be evident at only small companies with limited staff. But recent surveys of engineering groups and management teams

Components of prevention / FIGURE 1



There's **so much potential risk** riding on every new product launch. It's surprising **how ill-prepared many manufacturers** can be.

of large *Fortune* 500 companies show high percentages of management employees with a significant lack of knowledge in this area.[7]

In the best of situations, CEOs of companies would be out front on this issue and insist on developing this knowledge and expertise. In many situations, this effort is driven by quality management leaders.

But with knowledge and training, manufacturers could reduce the chances of problems and be in the best position to overcome any potential risks, such as recalls or lawsuits.

In some cases, a CEO might have a false sense of security about the company's abilities because of the company's comprehensive quality programs or certifications. One of the largest recalls and product liability disasters in the past eight years happened to one company that was QS-9000 and ISO 9002 certified. It cost that company and its supplier—Ford and Firestone—billions of dollars.

Quality programs don't offer much protection in this area. In fact, the programs might be a liability if documented audit records reveal the company isn't following its own procedures.

Engineers and others

CEOs might say they believe they have talented teams of design engineers. But it is quite common to find that many engineers and management personnel, especially as they get more experienced and feel more comfortable in their positions, never attend seminars or seek to further their knowledge in any given field.

Perhaps it's arrogance. The company unknowingly begins to digress as it no longer follows state-of-the-art design concepts and product safety innovations. This increases the company's own exposure to risk. The engineers and management personnel are the people the CEOs are banking on to develop the products of tomorrow and protect the future of the company.

Exposure to product liability shouldn't rest with just the engineering group. Actions, or lack of appropriate actions, by the management team (up through the executive ranks) can subject the company to product liability lawsuits. It can be a reason the company lost a lawsuit and was forced to pay hefty punitive damages (which, to their surprise, probably won't be covered by insurance).

When design engineers are the ones knowledgeable on product safety and liability prevention, these individuals will become enlightened in areas only they can control. But the rest of the organization won't gain any of the knowledge it must have. Engineers don't have power over corporate procedures that pertain to other functions.

To appreciate what this focus involves, you must understand the entire scope of product safety and liability prevention, shown in Figure 1. The sidebar, "Product Safety, Liability Protection," (pp. 30-31) details each component. Everyone must understand the potential issues and best practices and get on the same page. Members of management might begin to understand their specific roles to prevent the company from being hit with a product liability lawsuit.

Insurers, lawyers get involved

Major insurance companies around the world are seeking product safety and liability knowledge for their own representatives and in-house consultants, as well. As they learn the key elements of what manufacturing companies must have in place, they can use the information as a checklist to evaluate new manufacturing clients.

Some insurance carriers won't even insure manufacturers if they don't have a formalized recall program in place. For existing clients, initiating such product safety and liability programs can lead to reduced insurance premiums. Such programs can demonstrate that the clients' operations pose less risk for the insurance carrier.

Leveraging your corporation's legal defense firm might not always be an effective alternative. Surprisingly, product liability prevention is not widely known or taught by lawyers or law firms. Lawyers know how to defend a manufacturer in a product liability lawsuit, but most have limited knowledge of the inner workings of a manufacturing company, departmental roles and responsibilities, or how to incorporate such safeguards into procedures and processes.

In addition to preparing on the insurance and legal fronts, there is much for manufacturing companies to learn and implement internally:

- Design review procedures.
- Product safety hazards analysis.
- Product testing and design validation.
- Protective contracts and agreements.
- Good supplier selection and control.
- Recall plans of action.

Until manufacturers become better prepared, expect to see news on massive recalls and devastating product liability lawsuits grab more and more headlines.

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RANDALL L. GOODDEN is the president of Goodden Enterprises LLC, a training and consulting firm based in Eagle, WI. He is the author of two books on product safety and liability, including Product Liability Prevention—A Strategic Guide, *ASQ Quality Press, 2000. Goodden is an ASQ fellow and has served as chairman of ASQ's product safety and liability prevention interest group for the last 10 years.*

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Reliability in supply chain helps toymaker **thrive while spate of recalls plays out**

by Brett Krzykowski, assistant editor

In 50 Words Or Less

- Banned for more than three decades, lead resurfaced, and toy recall notices hit an all-time high in 2007.
- K’NEX avoided the callbacks thanks to its emphasis on reliability in the supply chain.
- As a result, the company increased sales, even as the rest of the industry experienced a downturn.

THEY SMILE BACK at us from hermetically sealed packages. They're the reason a trip to Toys R Us involves more tugs on pant legs than a stop at the tailor's. Thomas the Tank Engine, Curious George, Barbie—these are the new threats to children's safety?

Because of lead found in the surface paints of these products, yes. And companies many have grown to trust—Fisher-Price, Mattel, J.C. Penney—found themselves on recall lists instead of in kids' hands during the holidays. Some companies, however, were able to skirt the issue.

K'NEX, which has been producing construction toys since 1992, avoided getting swept away in the seemingly endless wave of recalls. And, in the months that followed, companies like K'NEX made one thing clear to the buying public: When it comes to product safety, play time's over.

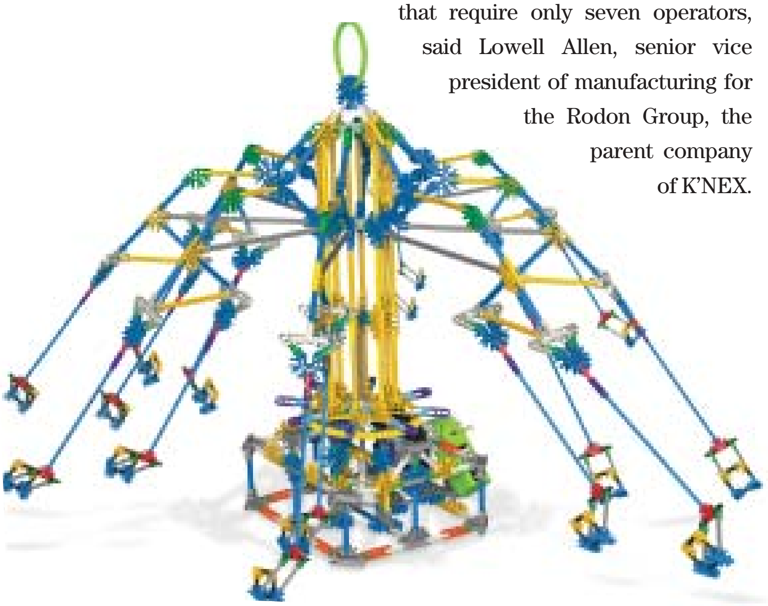
Recent events make it appear as though the lead paint issue cropped up out of nowhere. In fact, the United States has been trying to get a handle on the issue for more than three decades, beginning with the official ban on lead by the Consumer Product Safety Commission (CPSC) in September 1977.[1] But never had the CPSC issued as many toy recall notices in one year as the 81 it posted in 2007.[2] The reaction of parents, noted K'NEX President and COO Michael Araten, was understandable.

"As all of the other recalls happened, it became a highly sensitive issue, and the press picked that up," Araten said. "Consumers wanted to be sure what they gave their children was safe. Our switchboard was lit up with parents, and we got a ton of e-mails after the Mattel recall, which was followed shortly by the Thomas the Tank Engine recall. We had a lot of concerned parents and grandparents out there."

That feeling saturated the toy industry (see sidebar, "The Toy Industry's Lead Balloon," p. 40). But inside K'NEX headquarters in Hatfield, PA, there was little reason to be concerned. That's the benefit of knowing the links in your supply chain snap together as soundly as the offerings in your product catalog.

Material matters

In the midst of great uncertainty regarding overseas production, K'NEX is understandably quick to tout its "Made in the U.S.A." status. Its facilities in Hatfield house a high-volume production line of 107 machines that require only seven operators, said Lowell Allen, senior vice president of manufacturing for the Rodon Group, the parent company of K'NEX.



K'NEX Big Swing

Just as important, K'NEX takes the obvious precaution of not allowing suspect materials to get in the door.

"One of the keys is there's nothing toxic in the building," Allen said. "You couldn't mix anything up. From a resin standpoint, everything's qualified before we run it. Our color concentrates are produced by factories that are qualified. And they also do not have any heavy metals—lead or anything else—in their facilities. We couldn't even put that in if we wanted to. It's inherent in our business and has been for 20 years."

As Allen alluded to, just as important as what happens inside the walls of K'NEX and Rodon are the activities that occur outside the company's manufacturing facilities—at the home bases of its primary domestic suppliers: chemical company Ashland Inc. and polymer producer Ticona.

Piggybacking the 50-plus years of manufacturing experience of its parent company (see sidebar, "A Group Effort," p. 41), K'NEX follows the same partner selection process as just about any organization, with pricing and value playing their parts, Araten said. But equally as crucial is how closely a supplier sticks to a creed K'NEX has followed for years.

"If it works well in the field, our mantra is, 'Let's be a nonproblem for our clients,'" Araten said. "If materials are a nonproblem for us, we're going to continue to use it. If there's an alternative at a much better price, of course we're going to look at it. But we're not looking to make changes unless it can be proven to us that it's going to be a consistent winner."

Digging up that proof isn't a difficult endeavor in the domestic realm. But, as countless companies wrangling with recalls have discovered, it's a much more daunting task when it comes to overseas suppliers.

Teaming with possibilities

K'NEX was fortunate to have a mentor when it made its initial foray into the toy world. It leaned on industry veteran Hasbro, from which it licenses Lincoln Logs, to guide it through the labyrinthine Chinese market. In fact, Hasbro was one of the founders of the International Council of Toy Industries (ICTI), which certifies companies—primarily in China—through its ICTI CARE process.

After sifting through 20 or so factories that were already partners with Hasbro, K'NEX selected the two that best met its needs and, similar to its domestic partnerships, was loath to stray from its picks. That, Araten said, is the biggest reason for the company's conspicuous absence from the consumer warnings that have parents reholstering their credit cards.

"Our belief is that if you can find high-quality partners and treat them well, they'll treat you well," Araten said. "The longer the relationship is, the better their operation will be. The quality will be higher over time, their pricing will be better. As it inevitably comes up, you have a crunch for some reason or an-

THE RODON GROUP'S facilities in Hatfield, PA, house 107 machines that can be run by just seven operators.

other, the person you've had a relationship with for five, 10, 15, 20 years is more likely to help you than the person you've had a relationship with for five, 10, 15 minutes."

But even a company in the enviable position K'NEX finds itself can't allow its eye to wander from its far-afield partners, a reality verified by liability prevention expert Randall L. Goodden in ASQ's *Quarterly Quality Report.*

In the January report, Goodden underscores the need for organizations to conduct their own inspections of foreign suppliers to make sure products are being built to specifications. Turning a blind eye had a disastrous effect, as Chinese toys comprised 95% of all recalls in 2007, compared to 44% just five years before.

Although U.S. companies place great importance on monitoring production, "that's not the case in China," Goodden said in the report. "The whole quality system is a radically new thing to many Chinese companies … The bottom line with China at this point in time is that you can't fully depend on owners of these corporations to comply with your specifications."[3]

Nor could U.S. companies rely on the government to play watchdog—a misconception Goodden addressed in the report by pointing out that the CPSC is "a reporting agency, not an inspection agency" (see sidebar, "Enforcement: Federal vs. Financial," p. 42).

Knowing that, K'NEX has safeguards in place to keep its overseas partners in check, Araten said. They include its partnership with Hasbro, which has a quality control team in the Chinese factories every week; quarterly inspections by K'NEX personnel; and, in the last nine months, a layer of inspection performed by the Chinese government. According to Allen, K'NEX also has devices that test for lead and other heavy metals in its plants.

The costs associated with those measures certainly add up, but when considering the financial impact the rash of recalls had on the toy industry, it's easy to look at the preventive steps as an investment.

Bucking the trends

According to the market research firm NPD Group Inc., sales of traditional toys in 2007 fell 2%—to $22.1 billion—compared to 2006. In the critical holiday period between October and December, sales dropped 5%.[4] By staying out of the CPSC's crosshairs, K'NEX bucked that trend and posted a sales increase of 12% in 2007, including a 20% bump in December compared to the same month the year before.

Much of that success tied directly to the company's reputation as a U.S. based manufacturer, which, in turn, made it possible to tout that fact on some of its products. Of K'NEX's overall volume, 25 to 30% is made entirely in the United States, Araten explained. When that became a selling point, the company was able to resticker its storage tubs to highlight that fact within two weeks.

Had K'NEX chosen to rely more heavily on overseas manufacturing, the turnaround time for such a project would have more than doubled, which made the company re-examine how much it relies on labor on the other side of the globe. The goal now, Araten said, is to bring 50% of its production to the United States by the end of 2008. A shift of that magnitude will make it much easier to avoid the thorn that snags any company that relies heavily on foreign partners: time to market.

"If there's seasonality to your business, if it's not here in October, you're not going to sell it this year," Araten said. "If it's going to take 30 days to get here, obviously it has to leave in September, which means you're making it in July or August. That means in June you're deciding what you're going to sell and how much you're going to sell for Christmas.

"But if you're doing things over here, if you can push that decision back to Sept. 15, it gives you all kinds of flexibility."

It also assuages the fears of increasingly suspicious retailers, who constantly are searching for reassurance that the consumer, and not the retailer, will be the one taking the product off the shelf.

Helping provide that reassurance is the ISO 9001 certification the toy manufacturer always possessed but never had reason to highlight until recently. Once again buoyed by its parent company's long history, Allen said, K'NEX entered the industry with production

THE TOY INDUSTRY'S LEAD BALLOON

Although the Consumer Product Safety Commission (CPSC) has banned lead-containing paint since September 1977 (the rule went into effect four months later), for the majority of the population, the issue of heavy metals didn't start making noise until last June, when the RC2 Corporation recalled 1.5 million Thomas and Friends Wooden Railway Toys.

At the time, it was one of the largest lead-based recalls in history. But it wasn't long before the popular children's character had company, as 81 toy recall notices were issued in 2007, including 41 that involved lead.[1] The only time the toy industry remotely approached that number of callbacks was in 1989, when 52 were issued.[2]

Unable to ignore those numbers, mega-retailers Toys R Us and Wal-Mart informed their suppliers they would no longer accept toys that measured lead levels of more than 90 parts per million.[3] Those steps, however, didn't stop the Center for Environmental Health from uncovering five products in mid-March featuring Disney's Hannah Montana character that contained lead levels between three and 14 times the federal standard.[4]

In fact, through March 18, the CPSC had issued 18 toy recall notices in 2008, seven of which cited lead as the culprit—proving that the sprint to shore up product quality is more than likely going to be a marathon. —*B.K.*

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standards firmly in place and procedures for everything from design of the mold to running the tool. But, he continued, the real benefit of the certification is "the traceability, the paperwork. We can trace everything back to the lot number, the raw materials, the day it was produced."

The certification is, for all intents and purposes, a preemptive strike against anyone who questions the quality of a product, as well as retailers that are employing bigger and bigger magnifying glasses to reveal the flaws of their suppliers.

"Our guys just came back from a safety retailer's summit at Toys R Us headquarters in New Jersey, and they're really focusing on where the problem spots are, where they've been the last year or two," Araten said. "Well, we're not in any of those areas. That's not to say we don't get any inspections, because we do. But the level of inspection we'll have is going to be substantially different than some others might have because we've already proven ourselves."

But that doesn't mean the company has nothing left to prove.

Taking responsibility

At the core of the emergence of lead-laced toys is the issue of social responsibility, one facet of which is the expectation that companies will deliver products that aren't going to cause harm. The toy recalls that dotted the landscape shattered that expectation, and the damage done might extend well beyond that.

It's widely agreed that even the smallest amount of lead has an impact on the mental acuity of children. But, according to research released in January, there could be a connection between the decline in mental health of older adults and exposure to lead earlier in their lives, as children and young adults.[5]

If that impact isn't enough to make a company rethink its practices, the effect on its bottom line should be enough to motivate an organization to stay as far ahead of the game as possible, whether that means lessening its negative influence on its customers or the entire planet.

"We believe that being environmentally conscious has helped us tremendously on the business side and has made it easier to attract business over time," Araten said. "I think in the coming years, it'll make things even easier because people are trying to partner with people who have those practices in place. We've had that for 40-plus years, and we get a little better at it every year."

A GROUP EFFORT

For Joel Glickman, manufacturing runs in the family. His father was in the industry for almost two decades before helping found the Rodon Group, the company that gave birth to the construction toy K'NEX. And it wasn't long before Joel and his brother were brought into the fold of the family business. But it was Joel who conjured the idea for the toy while passing time within ear-splitting distance of a wedding band that made conversation impossible.

Although K'NEX has those enthusiastic musicians to thank for its existence, the credit for its success belongs at least in part to its parent company, which has been in the injection molding business since 1956.

Rodon's senior vice president of manufacturing, Lowell Allen, who has been with the company since 1972, had a front-row seat for the development of the construction toy. Considering Rodon's demonstrated versatility, he wasn't surprised to see the long-time manufacturer take on a more playful endeavor.

"The group has always developed many different products, and their forte always was relatively close to [what K'NEX does now]—high volume production," Allen said. "[Rodon] spent the first 30 years or so making everything from mundane caps and clubs, handle grips for bicycles, all the way up to medical-level things. The toy was a natural extension of what we do best."

Equally as organic was the back and forth between K'NEX and its parent entity, which had almost four decades of experience by the time the first K'NEX plastic rod rolled off the line in 1992. Before that happened, however, Rodon did what any good parent company does and shared its wisdom to ensure the newest addition to the family wouldn't fall in with the wrong crowd of suppliers.

"Having been in business for quite a few years now, we have a lot of fine partners that have been with us for 20, 30 years," Allen said of Rodon. "There's a lot of trust there and a lot of assistance from a technical standpoint. It somewhat goes back to the fact that we purchase a lot of material, and we only purchase prime material. But it goes beyond that because we have pretty personal relationships with a lot of those suppliers. Since we move a fair amount of volume here, it's pretty important that we have suppliers who aren't looking to screw up at all."

It was also crucial for K'NEX not to stray from that steady path, which allowed it to avoid the traps that have snagged other toy companies.

"When you grow up as a manufacturer, to survive and grow with the foreign competition that's developed over the last 20 years, you have to be a low-cost producer at very high quality," K'NEX President and COO Michael Araten said. "Once you factor the toy part of it into the equation, well, we're still going to make those parts with the same precision and quality that we make everything else." —*B.K.*

ENFORCEMENT: FINANCIAL VS. FEDERAL

One of the tenets of capitalism is that companies will always act with the best interest of consumers in mind or risk losing ground to competitors with safer products. In theory, government oversight can be limited to the policing of industry, which is a role the Consumer Product Safety Commission (CPSC) has filled since 1972.

The CPSC is largely a reporting agency and handles a minimal amount of inspection—around 1 to 2% of products in the estimation of Lowell Allen, senior vice president of manufacturing for the Rodon Group. That leaves it up to the market to keep companies in check.

"It's really up to the individual manufacturer, in my opinion, to police themselves, so we really try to do a good job of that," Allen said. "It's not anything against reporting to the CPSC. Typically, that's not our function. Our function is to police our factory over [in China], our own factory, and make sure we're doing our job."

The belief that it's in the best financial interest of a company to manufacture a safe product was echoed by K'NEX president and COO Michael Araten. "If they're perceived by the consumer to not be safe, they're going to be out of business," he said. "Mattel and Hasbro and everybody else has a profit motive to be safe because they want parents to buy these things for their children. Where the government can be helpful is in establishing a standard that has enough teeth so that the organizations are motivated to do what they should be doing anyway."

During the past year, however, the CPSC has been criticized as a largely toothless government body that failed to protect the public from substandard products. Congress vowed to act and followed through on that promise in March, when the U.S. Senate passed product safety legislation that began to address the concerns of consumers.

The bill includes an outright ban on lead in children's products (although parts children can't access will be exempt), an increase in funding for the CPSC and a boost in penalties to as much as $20 million for those who sell deficient products.[1]

The only discrepancy between the Senate and House versions of the bill is the power given to the states. The House wants state attorneys general to enforce product safety only after the CPSC has weighed in on a particular item, while the Senate wants to empower state attorneys general to make their own interpretation and act accordingly.[2]

Those differences aside, the legislative branch is motivated to move the bill quickly and, once a House-Senate conference is held on the matter, have a final version ready for Presidential approval by July. —*B.K.*

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That's a necessity in a business environment in which rapid changes in technology make it easier to reduce or even eliminate waste. Staying ahead of the next trend coming down the pike has allowed K'NEX to institute programs that cut cast-off materials to less than 0.1% and recycle enough water to fill eight Olympic-sized swimming pools a year.

That forward thinking approach also has the company studying energy solutions that include using solar panels or solar film, and the viability of hydrogen fuel cells to improve every facet of its day-to-day operations.

But what needs little improvement—and also serves as the basis for the company's social responsibility measures—are the priorities that govern the day-to-day decisions made at K'NEX. Remembering what comes first has prevented the company's leadership from losing sight of the formula that has worked for decades.

"For us, reliability is worth paying a premium for—quality as well," Araten said. "In order of importance, it's quality, reliability and then price. Now, obviously, there's always a sliding scale, and if someone can prove they're as reliable at half the price of our guy we're using today, we'll have to take a hard look at it. But if someone's quoting you half the price, once you really look into it, you're probably not getting the quality or reliability or experienced workforce or any of those things.

"Some truisms actually are true. Typically, you get what you pay for."

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Map Quest

Raytheon's **catalyst technique finds power** in organizational networks

by Tracy Cox

In 50 Words Or Less

- Raytheon uses social network analysis (SNA) to support its Catalyst Engagement projects.
- SNA maps and identifies informal networks and finds leaders with the right connections to head up improvement projects.
- Master Black Belts and Black Belts help informal leaders use a six-step Six Sigma process.

RAYTHEON SIX SIGMA is a proprietary six-step process that Raytheon Co., a defense and aerospace systems supplier, has embedded into its culture. It was developed by an internal team that was guided by the company's top leadership.

The team created the process by leveraging the company's best practices, benchmarking other companies' Six Sigma programs and using the assistance of external experts.

Raytheon Six Sigma's results can be demonstrated by examining how the company uses it as part of an initiative that requires a particularly rigorous application of Six Sigma's customer focus, cultural transformation and implementation tools.

Raytheon calls this initiative Catalyst Engagement. Created in 2003, Catalyst Engagement encompasses a rolling set of significant bottom-line oriented projects that have been identified and selected by the company's management team.

The team chooses these projects based on the contribution they will make to meeting strategic goals. Raytheon's goals include:

- Growing the business by increasing productivity.
- Focusing on activities that add value and eliminating those that do not.
- Transforming the culture.
- Understanding each customer's culture and anticipating its needs.
- Building lasting relationships.
- Becoming the supplier of choice.

Catalyst Engagement projects are providing the company with quantifiable bottom-line results in as few as 90 days.

Every Catalyst Engagement is supported by a Raytheon Six Sigma Black Belt (BB) or Master Black Belt (MBB). The project is led by a manager who participated in a workshop led by a BB or MBB. These managers are chosen through a disciplined process that Raytheon is helping to pioneer called social network analysis (SNA).

Social network analysis

A powerful diagnostic tool, SNA provides organizations a map of their informal networks—the constellation of relationships between employees who work together to create value irrespective of their designated roles. SNA gathers this information through a survey that reveals which employees interact by entrusting and supporting each other with information and ideas.

When completed, the study singles out the employees turned to most by others when they require collaborative effort. These value brokers aren't identified as such in a company's organization chart. They are hidden resources who can be identified only with SNA.

The study illustrates the links between employees in a diagram that resembles an airline hub-and-spokes map and is known as a sociogram. By reviewing the sociogram and its accompanying metrics, an organization can identify its hidden resources and leverage their effectiveness.

Raytheon consultants study SNA sociograms to identify the best-connected employees and select leaders for the company's Catalyst Engagement projects from this pool.

Six steps

The Catalyst Engagement process consists of six distinct steps that can be used by any organization (see Table 1, pp. 48-49).

1. Select projects: Raytheon's organizational leadership selects projects that will make the strongest contribution to helping the company achieve a strategic objective: for example, "Becoming the most admired defense and aerospace systems supplier through the development of world-class people and technology." The leadership team considers both growth opportunities and performance gaps.

Raytheon Six Sigma techniques that bring rigor to project selection include strategic visioning, business diagnostics, visionary team planning and strategic planning. Understanding strategic intent and assessing the current state compared with the desired state are keys to making an appropriate selection.

Once each project has been selected, it will be endorsed by the team. At times, the senior leader of the organization is included on the team, often identifying areas of the company for these engagements. Each project will be led by a member of the management team, who serves as the sponsor, and by a Raytheon performance consultant.

The leaders also provide visible support for the projects throughout their runs. For example, the questionnaire employees fill out for the SNA survey always includes an explanation of its purpose from a sponsor. For any organization, the active participation of its leaders is essential for making the process successful.

2. Conduct the SNA study: The study can include anywhere from 10 to several hundred employees, depending on the size of the unit concerned. Each study is customized and consists of a web based questionnaire and interviews of the participants in the unit being studied.

Examples of questions that are used include:

- Who are the four or five key people to whom you turn or who turn to you to accomplish the goals and objectives of your business?
- Who are the key people with whom you would spend more time collaborating on business issues if you had the opportunity?
- What is your best idea to for accelerating the

Projects that **might take months** to plan can be **completed in days or hours.**

growth objectives of your business?

The design of the survey is critical in separating fact and data from rumor and anecdote, producing a study that is valid and is interpreted correctly. It's easy to misinterpret a sociogram. This rigorous, analytic approach leverages key Six Sigma statistical skills such as regression analysis, log-linear analysis, statistical modeling and data display.

During interviews, the consultants use a range of discovery methods to further examine the nature of the relationships. They also ask the survey participants for their best ideas for increasing growth and innovation at their units. Valuable information is gathered here, at times including the names of external resources. The interviews also help Raytheon instill in employees a stronger sense of the company's vision and give them a more resonant voice.

3. Identify workshop participants: When the information from the survey is sliced and diced, the analysis package includes 40 to 50 slides with diagrams and metrics. Reviewing the data, Raytheon performance consultants identify the employees who have the most valuable connections with other employees and are potential leaders of Catalyst Engagements. Assessments are made with the aid of Six Sigma tools.

The selected employees participate in leadership development workshops led by the consultants. Between 40 and 50 employees are typically chosen.

4. Conduct leadership workshops and identify catalyst fellows: Raytheon performance consultants transform the study's analysis into an informative learning package that speaks the language of the workshop participants.

The consultants use Six Sigma to create the learning package. It incorporates some of the techniques of Edward Tufte that turn statistical data into information, thereby bridging the gap between the study's data and business objectives.[1] Data tables are converted to graphs and multidimensional displays to create denser illustrations with multiple data elements, yet keep the message simple and straightforward.

The workshops are led by BBs or MBBs who rely on the facilitation and teaching skills gained from their work as BBs. They use case studies, discovery and dialogue.

Participants review selected sociograms and slides from the survey analysis package. They develop a thorough understanding of the value of social capital and how networks function. The participants also learn how they can increase the productivity of their own networks.

The consultants use Six Sigma techniques to help the participants create proposals and action plans for the projects they will lead and to close strategic gaps. Included among the techniques are brainstorming, affinitization, root cause analysis, opportunity statements and action planning. There also are one-on-one coaching sessions, each taking 30 to 60 minutes.

Selected participants in these workshops, about one in 10, will be designated catalyst fellows and lead the projects the senior leaders selected during the first phase of the process. Altogether, a study will identify five to 10 catalyst fellows. Each workshop will result in two to five projects being selected for implementation.

5. Conduct Catalyst Engagement projects. The catalyst fellows carry out the projects as part of their ongoing functional responsibilities. They attract team members to their projects because they have strong networks, and those who sign on for the project recognize that it has senior leader support.

The catalyst fellows use the full six-step process of Raytheon Six Sigma to initiate, conduct and complete their assignments. They are aided by MBBs or BBs. Six Sigma is used to develop a business case for the project, plan a course of action and design measurement metrics that demonstrate value. The teams are empowered to secure the organizational resources they need.

Major projects often are conducted on a blitz basis with a cross-functional team. These projects are planned in meetings that include management representatives, so they can sign off on plans on the spot.

Projects that might take months to plan can be completed in days or hours. One three-day blitz

(continued on p. 50)

Raytheon Six Sigma's six steps / TABLE 1

Raytheon Six Sigma includes six steps:

Step 1—Visualize and imagine the future: Create a vision of the future with a clear and pressing need for change. Visualize is the step that starts the change process.

Keys to visualize:

Does the vision relate to the company's vision?

Is there a clear picture of the future that is easy to understand?

Is there leadership that will push, pull and cajole toward the future?

Key questions:

What is the current reality?

What is the vision?

What are the goals?

Do goals align with vision?

What's in it for the customer?

What's in it for suppliers?

What's in it for me?

How will the Raytheon Six Sigma process be applied to realize the vision?

Are you ready to act?

Are you ready to commit resources?

Change starts with a discomfort about the present and hope about the future.

Step 2—Commit to change: Develop a committed sponsor and team aligned with the vision, accountable and energized to make change.

Keys to commit:

Challenging the status quo.

Assigning the best people to make change happen.

Looking at the organization from a customer's perspective.

Working across functions to improve the value stream.

Developing people so they are ready to be empowered.

Key questions:

Is the vision clear to you?

Do you understand the vision and its underlying purpose?

Can you translate the vision into a picture (or vision) of your own potential or possibilities?

Can you explain it to others?

Where do your products or services fit into the value delivery system?

What are your goals and objectives?

Have you characterized, captured and established a team?

Does the team include stakeholders in the process?

Is the team trained in the Raytheon Six Sigma process, or does it know where to gain this knowledge or skill?

Does the team have a case for action and feel the need for change?

What other initiatives or barriers might affect this team's role or effectiveness?

Does your team understand its role in the change process?

Do your team members understand what's in it for them?

Does the team have a committed sponsor?

Step 3—Prioritize and determine improvement: Define goals and action plans. Commit resources to focused improvement projects to realize significant results.

You can't fix everything at once. This phase makes the process rational. It is a key part of baseline.

Key questions for understanding value delivery:

What is our value proposition?

What is the value stream?

What process are you responsible for?

Who are the process owners?

How well do the processes work together?

What are the strengths and weaknesses as seen by the customer?

Key questions for performing assessment:

What's the scope? What is fair game? Are there boundaries?

How receptive are the scoped areas for change? How do you know?

Who will perform the assessment?

What is your process for performing the assessment?

Keys for identifying opportunities and high leverage points:

What processes have the highest priority for improvement?

What data supports your conclusion?

What are the sources of waste and key leverage points and how did you determine them?

Keys for estimating expected results and prioritizing opportunities:

What are the expected results?

What's the expected return on investment?

What's the impact of each opportunity on customers (other segments or programs)?

What's the rank order for attacking the improvement opportunities? Why?

Keys for documenting the improvement plan:

What are the (rough estimate) project goals (for example, work in process, cycle time and defects/yields)?

What is the project schedule (first order milestones)?

What are the early success indicators?

What are the risks, countermeasures and payback?

Keys for obtaining commitment to support the plan:

Do we have an agreed on contract for change?

Do we have leadership alignment?

How do we know?

What human resources am I willing to assign?

How much personal time am I going to commit?

Have key resources been identified and assigned?

What skills are required?

Step 4—Characterize: define the existing process and plan improvements: Understand and document current-state performance (metrics, process flow and critical factors). Translate the current-state opportunities into a plan for improvement.

Key questions:

Who are the process owners?

Has the cross functional, customer oriented team been assembled to analyze the value stream?

What is the actual process flow? How is it documented?

What are the customer-driven specifications for the goals?

What are the process performance measures and goals?

What is the actual process flow?

How is it documented?

How accurate are your measurement systems?

How aligned are your measurements to the customer and throughout the organization?

Do you use your measures to run your business?

What are the critical factors that determine process performance?

Have you identified the value stream and the value added and nonvalue added activities?

What are the sources of variability?

Which sources of variability can we control?

Is there an inconsistency in where leadership thinks we are and where others think we are?

What types of improvements are required?

Do the improvements get at structural and management systems changes needed for success?

What are the implementation costs and expected benefits and return on investment?

Has the improvement plan been documented and communicated?

Step 5—Improve: design and implement improvements. Design and implement integrated improvements and control systems to maximize value:

- Redesign, reinvent and optimize the process.
- Change the organization—the physical layout, the running rules, the process flows and the control system.

The meat of the entire process is in this step. Historically, people have done a little prioritizing and then jumped headfirst into improve. This step doesn't work well if the first four steps haven't been done correctly.

Key questions:

Who are the stakeholders?

Are the stakeholders involved?

Are we continually transferring knowledge about our process?

What resources are required to be successful?

What barriers (such as structural ones and policies) will prevent successful implementation?

What settings for key variables will optimize performance?

How do we know we've improved (measures)?

How much waste and variability still remain?

Is this a breakthrough solution?

Does the solution support organizational transformation?

Is the value stream as simple as possible?

Is the group organized to maximize support for the value-delivery process?

What control and management systems will we need to keep it this way?

Are the costs and benefits real?

How do we avoid sub-optimization?

Are countermeasures in place to keep us from going back?

Are we continually transferring knowledge about our process?

Step 6—Achieve, celebrate achievements and build for tomorrow: Deliver measurable results that change the way people think act, create knowledge, build momentum for continuous improvement, celebrate success and get people excited about doing Raytheon Six Sigma repeatedly.

Here we realize the gains, transform the work team, modify the culture and capture the knowledge. We have to solidify the new process, modify the culture to support ongoing improvements, share the knowledge and start all over again.

Key questions:

Do metrics link objectives, results and actions?

How do you monitor and document results, including financial effects?

Are you sufficiently monitoring your metrics?

How do you communicate results?

How do the results align with Raytheon's vision and goals, customer value, and organization, team and employee goals?

If results do not align, what is your corrective action plan?

What have you done to ensure that gains are sustained?

How do you recognize and celebrate success?

Do you have a plan for capturing and transferring knowledge? How do you know that it is happening?

Have you built momentum by developing and nurturing new leaders at all levels in the organization?

How have behaviors changed to reflect and reinforce Raytheon Six Sigma?

What are the next steps to eliminate waste in this value chain?

What are the next steps to improve value in this value chain?

What is your vision going forward?

(continued from p. 47)

totally changed the structure of a manufacturing floor.

6. Complete the process. To help meet every project's objectives, the company's organizational leaders conduct scheduled review sessions: 30-day reviews are held to set an expectation of quick results and focused attention and to quickly realign strategies if a mid-course correction is needed. There also are 60-day and 90-day reviews.

Raytheon Six Sigma is used to determine progress from a disciplined process approach that forces identification of root causes and evaluation of quantifiable results with bottom-line impact. When mid-course changes are needed, they are made. Follow-up workshops might be conducted.

For any organization, the active **participation of its leaders** is essential for **making the SNA process successful**.

At the project's conclusion, everyone, including sponsors, comes together to celebrate the achievement of results. Teams might have uncovered the need for other projects while they were accomplishing their work. The event creates an opportunity to launch the related projects that might have potential.

Support for other initiatives

Apart from helping make Catalyst Engagements as productive as possible, SNA provides Raytheon with actionable information that supports other improvement initiatives.

For example, the studies help the company develop stronger links between groups of employees whose collaboration is essential for success by pinpointing where there is "white space" between these groups.

Studies also identify employees who represent critical node points and whose absence would seriously impair productivity. This knowledge will become increasingly important as the employees who belong to the baby boomer generation retire and must be replaced.

SNA also helps Raytheon learn to:

- Determine where expertise resides in the organization and how to access it.
- Give new leaders of business units a quick snapshot of the unit's dynamics.
- Identify future leaders.
- Seamlessly integrate employees from acquired companies.
- Use the employee skills of outsourcing partners more productively.
- Improve the channeling of knowledge.
- Make more effective hiring and promotion decisions by recruiting for the skills used by value creators.

Because employees tend to interact primarily with others who are a lot like themselves, SNA also helps increase the diversity of relationships.

Once an organization has restructured, SNA can help assess the health of the new informal structure. Research has demonstrated that large-scale change initiatives often impair the effectiveness of established networks while doing little to develop new relationships.

SNA also does the following:

- Identifies value creators whose contributions might not have been fully recognized.
- Maximizes their contributions with recognition and rewards that improve their motivation.
- Fosters a culture of trust based on shared norms.

In short, the process helps Raytheon capitalize on opportunities and resolve problems, all with the aim of helping it meet its strategic goals.

Catalyst Engagements are conducted throughout Raytheon's business segments. There are short-term projects that involve small workgroups and company-wide activities and initiatives involving the full value chain, including employees, suppliers and customers.

SNA recently helped a new Raytheon functional leader understand the dynamics of an organization that extended across several states.

The organization's charter was to support the growth objectives of the business. This required close collaboration among employees, but SNA identified several well-ingrained silos of technology and geography that were hampering objectives. By leveraging some key people in the network, the leader broke down the silos, created a better knowledge flow across the group and aligned it with an innovative growth strategy.

SNA also helped two Raytheon organizations interact more effectively. One of the organizations was strategically focused on growth and the other focused on execution. This difference led to friction between the two. SNA and a follow-up workshop identified key tension points, helped develop better working relationships and created an environment that is allowing both groups to meet their goals.

Ongoing research

SNA is based on decades of research in the fields of economics, sociology and survey science. Ongoing research is quantifying the need to better understand the hidden power in social networks and how to leverage it.

A recent article in the *McKinsey Quarterly* reported that nearly 80% of senior executives surveyed in a 2005 study said that effective coordination across product, functional and geographic lines was crucial for growth. Nevertheless, only 25% described their organizations as effective at sharing knowledge across boundaries.

The article noted that companies operating without a network perspective allocate resources inefficiently, manage talent blindly and experience consistently large disparities in the effectiveness of collaboration within and across units.[2]

The ways in which organizational flattening is making SNA more useful is explained by Ronald S. Burt:

> Efficiencies gained by removing layers of bureaucracy shift control from vertical chains of authority to horizontal peer pressure. Work once defined by superiors in the formal organization is now negotiated between colleagues who have no authority over one another. People are more than ever the author of their jobs, not told what to do so much as expected to figure it out.[3]

The fragility of silo-centered networks is discussed at www.orgnet.com:

> A very centralized network is dominated by one or a few very central nodes. If these nodes are removed or damaged, the network quickly fragments into unconnected subnetworks. A highly central node can become a single point of failure. A network centralized around a well-connected hub can fail abruptly if that hub is disabled or removed. A less centralized network has no single points of failure. It is resilient in the face of any intentional attacks or random failures—many nodes or links can fail while allowing the remaining nodes to still reach each other over the other network paths.[4]

Knowledge environment

SNA's continuing growth is being fueled by a greater understanding that in today's knowledge-intensive business environment, a great deal of critically important work is being accomplished through informal networks. Leaders are coming to grips with the futility of allocating scarce resources only to units that can be found on the organization chart.

Readers wanting further information about SNA can learn more by taking part in the activities of the International Network for Social Network Analysis.[5] The organization sponsors an annual international conference, hosts a discussion forum, and publishes a journal, bulletin and other materials.

Additional information is available at the Network Roundtable at the University of Virginia, which focuses on using SNA to deal with critical business issues.[6] It provides online tutorials and other training materials, conducts workshops and publishes papers.

Like physical, financial and human capital, social capital is a significant asset. Though in many environments it still is underappreciated, it might be the most powerful asset an organization possesses.

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TRACY COX is director of performance consulting for Raytheon Professional Services (RPS) LLC, Garland, TX, a subsidiary of Raytheon Co. He earned a master's degree in manufacturing systems management from Southern Methodist University.

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Helping Ease The Transition

Without the right workforce training, any process improvement can falter

by John R. Schultz

In 50 Words Or Less

- Most process improvement projects lead to changes in the way a workforce handles business activities.
- Sometimes the workforce becomes uncomfortable with change and resists. Tension and anxiety often rise because of the revised operations.
- A well-developed training program can ease the transition to any new work arrangement.

SIX SIGMA AND PROCESS improvement projects include implementation steps that typically alter workflow and deployment of labor to create a more effective and efficient process. New connections and relationships are established that reinforce new methods.

Often, employees expect things to function as if nothing new had happened. They're usually left to their own devices to adapt to unfamiliar arrangements.

Regardless of how much they want to or how hard they try, employees cannot perform well at a job until they know what is expected and how tasks should be done. A well-developed training program can ease this transition and address the "what" and "how" of the new work arrangement.

Training or retraining should not be left to chance when changes of any kind are implemented—there is too much at stake. Momentum can be lost, and improvements can founder as people try to redefine their responsibilities and relationships. Resistance also can reassert its influence as frustrations rise among bewildered workers adapting to new conditions.

Therefore, training must be part of any change for the better. It builds confidence and reduces uncertainty about altered roles and expectations. Workers and supervisors both will appreciate the opportunity to improve their usefulness and expand skills so they can readily function in the reconfigured environment.

People learn in different ways

People view and perceive the world in slightly different ways. We all gather information and make decisions about events according to different patterns. This means that training should have sensitivity and tolerance toward various learning styles.

Swiss-born psychiatrist Carl Jung suggested that learning is a two-step process in which perceptions are made by collecting information and then judged by analyzing and mentally processing that information. There are two ways of perceiving or finding out how things work: sensing and intuition.

Those who are sensors operate in the here and now. They are active learners who focus on things as they are and grasp ideas by doing. Those who are intuitive have a different perspective. They prefer to watch and observe, and then reflect on what is occurring.

The two means for judging perceived information are thinking and feeling. Thinking judgments tend to be rational and are based on fact, logic and external evidence. Decision making in this case is often impersonal. In contrast, feeling judgments are based on values, personal beliefs and subjective internal evidence. Decision making for these individuals is based on likes and dislikes.

Jung's theory concludes that people tend to use one perception and one judgment style at a time. Depending on the situation, opposite combinations might be used, but not at the same time or with the same frequency. The preference for a particular arrangement develops over time and becomes the comfortable way of making sense of the environment. These preferences become a style for learning and teaching.[1]

This process of considering events and rationalizing them for use has several implications.

First, no matter how well intentioned, the change and accompanying improvements might be handled differently than expected. In the absence of formalized direction, people will grapple with issues to find a mutually agreeable approach.

Second, this period of struggle takes time, but this stage can be reduced through a structured approach to learning. Education and training significantly

Adult learner characteristics / TABLE 1

Learner characteristics	Learner implications
Self concept: Adult learners see themselves as capable of self-direction and desire others to see them in the same way. A capacity for self-direction is a good way to define maturity.	• A climate for openness and respect is helpful in identifying what learners want and need. • Adults enjoy planning and carrying out their own learning activities. • Adults need to be involved in setting and evaluating their own progress toward goals.
Experience: Adults bring life experiences to the learning process. Adults define who they are in terms of experiences. They are who they are as a result of those combined experiences.	• Less use of transmittal techniques such as lecture and more use of experiential techniques. • Discovery of how to learn based on past experience is part of self-actualization. • Mistakes are opportunities and part of the learning process. • Discounting experience discredits the adult learning process.
Readiness to learn: Adult development is increasingly toward occupational and social competence. They are eager to advance skills that prepare them for work and life.	• Adults need opportunities that help identify competency requirements for social and occupational roles. • Adults' readiness to learn and teachable moments occur where learning opportunities coincide with the need to know. • Adults can best identify their own readiness to learn and teachable moments.
Time and problem orientation: Adults think and learn as a way of being more effective in their immediate environment.	• Adult education needs to be problem centered rather than theoretical. • Curriculum development should focus on what the learners need to function in the current environment. • Adults need opportunities where they can learn quickly and apply ideas promptly.

Source: Malcolm Shepherd Knowles, *The Adult Learner: A Neglected Species*, Gulf Publishing Co., 1981.

There are two ways of **perceiving or finding out** how things work: **sensing and intuition.**

increase competency transfer, facilitate collaborative inquiry and accelerate the integration of new methods into the revised process.

The adult learner

Although there are differences in how people learn, adults as a group have some common preferences when confronted with formal learning situations. The use of adult learning principles increases commitment, retention and the ability to provide meaningful content. When developing training, subject design should include features that recognize learner maturity.

The following are suggestions for developing training for adult learners:

- Prepare instructional materials to be situation oriented rather than content oriented.
- Accept and encourage active participation.
- Use instructional materials and activities that build on the learners' experiences.
- Create a collaborative learning environment rather than one that is authority centered.
- Solicit learner input when designing and structuring training activities.
- Provide assessment with criteria mutually agreed on by the learners and instructor.
- Permit reappraisal and additional opportunities for improvement in the assessment.
- Organize experiential based activities rather than theoretical based activities.

Remember, when introducing system or process improvements, training that considers learning differences and relates new patterns to past experiences most likely will be successful. Adult workers bring along considerable knowledge. Through trial and error, they developed structures for getting work done in the current situation. Don't shortchange their efforts and capability when fashioning new work patterns. Respect and consider their needs when improving operations. Table 1 describes adult learner characteristics.

The training cycle

The training cycle consists of four basic steps: preparation, planning, presentation and evaluation. When developing a training program, the best place to start is to identify organizational expectations and trainee needs. Spend adequate up-front research time by observing the changed work process, asking questions and gathering information. Then define capabilities that learners should have when instruction is completed.

In addition, clarify the context in which the training will be delivered. Will it be in a classroom setting or on the job? There is more to developing new skills than presenting ideas or telling someone this is how things should be done. Instruction is best handled as a structured process that builds on past experiences and incorporates them into a new way for getting work done.

The training cycle is characterized by the following four steps:

1. Prepare for the training: Determine what is needed by gathering facts. Consider organizational expectations for results and learner needs to accomplish these outcomes. Observe how the process is doing. Ask questions, and then decide where there are gaps. Define desired outcomes and learning objectives so shortfalls are addressed. Learning objectives should describe what will be taught and what the learner should know when the training is done.

2. Plan the training: Decide how skills upgrading will be handled. Create a lesson plan and decide how much time will be devoted to each learning objective. Decide what teaching methods will be used, and adapt them to each learning objective. Provide for learner activity, interaction, practice and processing. Consider instructional aids and materials that will be used. Determine what will be said, and write a script if necessary. Test your preparation by doing a practice run to evaluate continuity, transitions and timing. This will help manage your uncertainties and apprehensions about making the presentation. In addition, think about questions that might be asked, and consider appropriate responses.

3. Present the training: Engage the learners in the skill building process. Establish the focus by letting participants know what to expect and what will be accomplished. Ask if there are unmet needs or topics that might require specific attention. Then present the concept or concepts by working through the lesson plan. Make your points more convincing by relating examples to events where there were positive and consequential outcomes. Summarize frequently, and make sure there are opportunities for audience participation and questions.

4. Evaluate the training: Measure results and make adjustments. This is where learner skills and outcomes are assessed by evaluating results against objectives. Although assessments are usually thought of as a final activity, they can take place at any time during the learning process. Designing learning activities so performance automatically indicates comprehension is an easy way to handle appraisal. If results do not match expectations, then be sure to provide additional feedback, coaching and follow-up. In addition, assess your success as a trainer by surveying learners and observing how skills are applied, then plan and make improvements.

Instructional methods / TABLE 2

Learner involvement	Method	Description
Learner listens or watches.	Lecture	Talking and verbal imagery.
	Reading	Printed content, including handouts and assigned text.
	Demonstration	Modeling activities either live or filmed.
Learner writes, talks or responds.	Programmed instruction	Information is delivered in small, sequential steps using self-paced activities and responses.
	Structured discussion	Led by instructor, aimed at specific objectives, statement and response format.
	Panel discussion	Expert panel delivers short lectures and involves learner in sharing ideas and opinions.
	Open discussion	Instructor serves as moderator while learner shares ideas and opinions on a specific topic.
	Question and answer session	Instructor assigns topic, and learners develop questions and respond with answers.
Learner manipulates or operates.	Performance try-out	Under instructor direction, learner actually performs specific tasks.
Learner makes decisions and creates knowledge products.	Brainstorming	Learner is asked to develop diverse ideas on a specific issue.
	Case study	Learner is asked to develop and present a solution for a hypothetical situation.
	Incident processing	Learner is asked to analyze and problem solve a specific event.
	Task team	A small group of learners is asked to problem solve and present its recommendations.
	Fishbowl	Learners are asked to observe and analyze the activities of a specific operation or another group.
	Role play	Learners are asked to assume specific behaviors and act out scenarios, and then analyze results.
	Simulation	Learners are asked to work through a real situation, then analyze results.
	Clinic	Learners are asked to confront a real-life situation and develop a method or solution.

Source: Laird, Dugan, *Approaches to Training and Development*, Addison-Wesley Publishing Co., 1978.

Instructional methods

Because learning theory indicates adults prefer some degree of control over the learning process, varying the method of presentation is important. To achieve this ownership, lesson planning should present many opportunities for active involvement. Table 2 summarizes different instructional methods and organizes them in order of increasing learner involvement.

When designing a training program, a multidimensional approach to trainee involvement seems to work best. Students often need to encounter material at different levels of involvement. Therefore, progressing from instructor show-and-tell to learner decision making and hands-on participation will set and reinforce new skills at a level that makes application more certain.

Choosing which training methods work best in a particular situation depends on participant knowledge, skill, attitude and time available for curriculum design and instruction. Here are some questions that can help clarify the selection of instructional methods:

1. How complex is the information or skill that will be introduced? More complex concepts typically require multiple approaches. These approaches might include having learners read to prepare for the session, lecture and demonstration to present the concept, discussion to understand the concept, and learners actually attempting the concept.

2. How resistant will participants be to active involvement, the use of certain technology or passive activities such as reading, listening and watching? Adapt the methods selected to learners' likes, dislikes and capacity to interact. As an example, small group activities might not work well in an environment in which participants are not used to teamwork and collaboration.

3. How much time is available to secure the skill or information transfer? Recognize that learning activities might take longer than anticipated. Select methods that will allow participants to complete the full training cycle, and engage learners in information integration and skill application. But don't let time pressures force you into using only passive or trainer-dominated activities.

4. How confident are you in your ability to apply a specific method? Plan for and use methods that you feel comfortable with in a particular situation. But don't limit your approach to only a few proven techniques. Introduce and use new methods in circumstances in which time pressures are low and participants are open-minded to experimentation or a less-polished presentation.

5. How much work is involved in preparing for and using a specific method? Consider access to equipment, room availability and setup requirements. Developing a case study or activities in which there are high levels of team processing might not fit the available development time. Limit the number of activities. For example, rather than performing a case study with incident processing and brainstorming, use the case study coupled with a structured discussion.

Developing a lesson plan

When developing a lesson plan, the first concern is creating objectives. Just as the improvement project or change program had objectives, it is equally important to define what the learner should know and be able to do after the training is complete. Objectives define what will be accomplished and affirm expectations in clear and measurable terms.

When developing and writing objectives, make them understandable and attainable. The trainee and trainer both will be frustrated if expected results are not obvious and appear impossible to reach. At the conclusion of training, those involved should be able to tell whether the objectives were met. The stated objective becomes the measure against which accomplishments are judged.

As an example, the learning objectives when reading this article include:

- Examine the problem of improvement integration

Sample lesson plan / TABLE 3

Training topic: Reading and using shop work orders.

Lesson objectives:

1. Examine the shop work order and its function.
2. Explain what information is contained in the shop work order.
3. Describe how to reconcile differences between the shop work order and drawing material list.

Content	Activities	Time
1. The shop work order and its function. 2. Shop work order organization and components. 3. Flow path of shop work order through the plant. 4. Comparing shop work order and drawing revisions. 5. Dealing with discrepancies between shop work order and drawing material list. 6. Handling parts shortages.	1. Present a brief lecture explaining what a shop work order does.	10 min.
	2. Using the overhead, explain shop work order organization and where information is located.	5 min.
	3. Using the overhead projector, describe the flow of a shop work order through the plant and where information comes from.	5 min.
	4. Place participants in groups of two or three. Have groups propose three questions about information location and origin. Have groups exchange questions and answers.	30 min.
	5. Using the overhead, explain how to compare shop work orders and drawings for correct revisions and material lists.	5 min.
	6. Place participants in groups of two or three. Provide groups with sample shop work orders and drawings. Have them identify specific information and discrepancies.	30 min.
	7. Explain how to handle parts shortages.	10 min.
	8. Test for comprehension using verbal questioning in a "Jeopardy" format.	20 min.
	9. Assess value of training for participants using a written survey.	5 min.

and the need for training.

- Define the characteristics of an adult learner.
- Identify the steps to be followed when developing a training program.
- Examine the use and selection of various instructional methods.
- Describe the elements of a lesson plan.

Notice these objectives begin with a verb that indicates intent and then proceeds to state the expected outcome. When training is defined this way, the instructor and trainee both have a clear idea of what will be learned over the course of the training session.

After learning objectives have been selected, they must be supported with content and activities. Creating a lesson plan helps organize and sequence how subject matter will be presented. The plan clearly indicates what will be done and how much time will be devoted to each activity. It ensures the right issues are addressed, the right material is included and the presentation is ordered and understandable. In addition, the trainer can feel confident there will not be uncomfortable gaps or downtime. Table 3 (p. 57) illustrates a sample lesson plan.

When the lesson plan has been completed, it might need to be reinforced further with information and activities. This requires the use and introduction of statistics, facts, examples, comparisons and inquiry. Spend some time digging and deciding how these forms will supplement the lesson plan and aid your presentation. Think about how these materials can be organized to support instructional methods that ensure learning.

The act of teaching typically has four steps. Each step must be covered for learning to occur. The steps are:

1. Arouse interest: Start by citing personal benefits and establishing a positive relationship. Do things that raise curiosity, create a desire, awaken possibilities, raise questions, calm fears and remove barriers.

2. Engage the learner: This is where the learner encounters new information or skills. Use any of the visual, auditory and tactile methods described in Table 2 (p. 56) to create a learning experience.

3. Facilitate integration: Provide an opportunity for the learners to play with the new information or skill. Get them to try things out, gain experience through trial and error, exercise judgment, establish meaning, draw conclusions and connect the new method with what is already known.

4. Enable application: The new knowledge or skill is transferred to a real-world situation. Have the learner problem solve using the new information or skill, accomplish something meaningful or demonstrate competency in the work setting.

In reality, lesson plans are the agenda for a meeting in which knowledge and skills are transferred. And much like a well-run meeting, the process of teaching and learning is structured, managed and interactive.

Forethought and planning

Anytime there are alterations to established routines, no matter how inconsequential, someone has invested time and energy in the existing operations and will find proposed revisions unsettling. The time involved to get the revised operation up and running can be greatly reduced through training. It's a course of action that can be used at several points during the process of change: at its inception, when people require information about what is going to happen, and in later stages, when people are trying to adapt to their new situation.

Training can be used to provide information, lower anxiety and uncertainty, counteract resistance and improve transitional skills. Training is a tool that should not be overlooked or given casual consideration. It should be carried out with forethought and planning, and then proficiently delivered.

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JOHN R. SCHULTZ is a management consultant based in West Bend, WI. A retired college professor and program director, he administered a technical certificate program in quality management. He holds a master's degree in management from National-Louis University, Evanston, IL.

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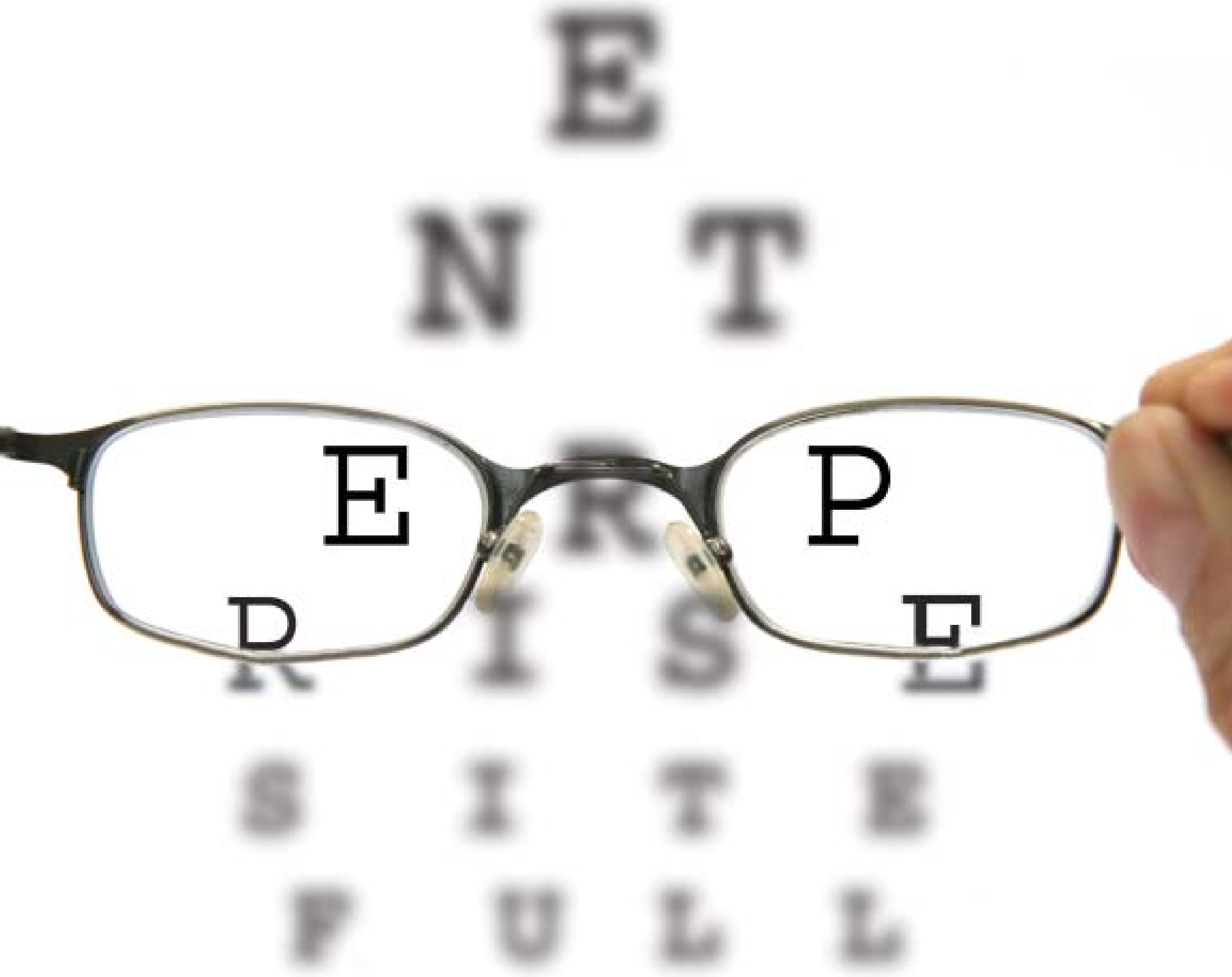

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BY R. DAN REID

Hazardous to Your Health

Quality professionals must unite to improve healthcare

ONE HOSPITAL CHAIN in my area has a snappy ad saying your selection of a hospital could be the most important choice you will ever make. This might be true—going into the hospital these days can be hazardous to your health.

"As many as 98,000 people die in any given year due to medical errors that occur in hospitals," according to estimates in the Institute of Medicine's (IOM) 2000 report "To Err Is Human."[1]

If true, this exceeds the number of people who die from attention-getting motor vehicle accidents, breast cancer or AIDS. Further, the estimate of nearly 100,000 does not include patient injuries or near-misses in hospitals, or deaths outside of hospitals.

Has it improved?

"In a nutshell, U.S. consumers and taxpayers get a bad deal," one writer says. "We pay double what any other country does and we get inefficient, unsafe, poor quality healthcare."[2]

"The average ICU patient experiences 1.7 errors per day, nearly one-third of which are potentially life-threatening. Most involve communication problems," another study found. [3]

Some progress had been made: "In 2003, the Accreditation Council for Graduate Medical Education began enforcing limits on residents' duty hours (maximum of 80 hours per week or 30 hours per shift)."[4] Would you want somebody who had been on duty for more than 20 straight hours operating on you?

Last November, a medication error made headlines when twins born to actor Dennis Quaid and his wife were given 1,000 times the intended dosage of blood thinner at Cedars-Sinai Medical Center.

At that time, the Institute of Medicine (IOM) reported that at least 1.5 million Americans a year are injured after receiving the wrong medication or the incorrect dose and that such incidents have more than doubled in the last decade.[5]

Serious injuries associated with medication errors reported to the Food and Drug Administration also increased—from about 35,000 in 1998 to nearly 90,000 in 2005.

Of those cases, more than 5,000 deaths were tallied in 1998, but more than 15,000 deaths were reported in 2005.[6]

From this information, it is not clear whether healthcare is getting worse or incident reporting is getting better.

In 2007, the Institute for Healthcare Improvement (IHI) ramped up its successful "100,000 Lives Campaign" to a two-year "Protecting 5 Million Lives From Harm Campaign."

How much harm? IHI says there are some 37 million hospital admissions each year in the United States and 40-50 patient injuries for every 100 hospital admissions. At this rate, there are some 15 million patient injuries per year in the United States.[7]

Rising costs

This February, the Associated Press estimated overall healthcare spending in 2017 would increase to $4.3 trillion. The report says that in 2006, people and the government spent $2.1 trillion on healthcare, an average of $7,026 a person, and that in 2017, health spending will cost an estimated $13,101 a person.[8]

The Journal of the American Medical Assn. (JAMA) recently said, "Rising healthcare costs in America continue to be a stumbling block to improved care, but researchers discovered that improving care by preventing errors and falls could bolster the value of healthcare and patient outcomes. Researchers estimate waste from illegible prescriptions, poor preventive care and other failures accounts for up to 50% of healthcare spending."[9]

"A recent American Society for Quality/Harris Interactive poll of U.S. adults 18 years of age or older confirms that this group is more concerned about the rising cost of healthcare than the Iraq war," Martin Merry, M.D., said. "Could this elevated concern about healthcare costs, and arguably value, be the catalyst that drives true change in our healthcare system?" [10]

Systems thinking

Significant change is needed. Merry points out that Secretary of Health and Human Services Mike Leavitt refuses to use the term "U.S. healthcare system" and speaks of a healthcare sector seeking to become a system, which he predicts will happen over the next 10 years.[11] Systems thinking and quality management systems are key elements of the quality body of knowledge.

HEALTHCARE QUALITY

To read other articles about quality and the healthcare sector, go to the Keeping Current section starting on p. 14 of this issue of QP.

Error-proofing methods implemented in other industries can be effectively applied to healthcare to virtually eliminate many errors. For example, anesthesiology is one hospital discipline that has used unique coupling devices for each type of gas to virtually eliminate errors.

Auto industry response

In response to the first IOM report on medical errors, the Automotive Industry Action Group (AIAG) and ASQ Healthcare Division published a guidance document for healthcare organizations, *Quality Management Systems—Guidelines for Process Improvements in Healthcare Organizations* (AIAG HC-1).[12]

The document, which is based on ISO 9004:2000, also includes a substantial glossary of terms, proven quality improvement practices and methods that could be easily applied to healthcare, such as error proofing, document control, quality and business planning processes, internal communications process and internal auditing.

Late quality guru Philip Crosby taught that communication in large organizations is hard at best, pointing out that unless it is worked on, it will not happen. The impact of poor communication in the ICU was discussed earlier,[13] and it was implicit in Secretary Leavitt's comments.[14]

The stated goal of the AIAG HC-1, released in January 2001, was, "To aid in the development or improvement of a fundamental quality management system for healthcare organizations that provides for continuous improvement, emphasizing error prevention, the reduction of variation and organizational waste, for example nonvalue-added activities."[15]

Interest from other countries led AIAG and ASQ to release HC-1 under the auspices of the International Organization for Standardization, as the first industry workshop agreement (IWA-1) with the same basic goal, name and guidance.

IWA documents expire after a maximum of six years, so last fall, AIAG released a new hybrid standard, *Business Operating System (BOS) for Health Care Organizations—Requirements for Process Improvements to Achieve Excellence* (HF-2),[16] which is based on the Baldrige healthcare criteria and ISO 9001:2000, to replace the now-expired IWA-1.

While these documents have evolved to include more healthcare terminology and examples, the intent and much of the content has remained the same. It includes methodology from the global automotive industry, including some elements of the Toyota Production System (TPS), such as workplace organization, pull systems of inventory management, visual controls and support for the employee.

A **grass-roots effort** is needed to drive **quality into healthcare.**

Merry points out that Washington state's Virginia Mason Health System has virtually adopted TPS. "One of Mason's vice presidents said, 'We're now six years into our Toyota journey and achieving remarkable results in both quality improvement and cost containment. But our mentors tell us that we have another 15 years' hard work if we wish to fully realize the potential of Toyota's current and always evolving methods.'"[17]

Healthcare will need many more such mentors in the coming years to help implement the needed process and quality improvements.

What is needed now?

A strong cultural resistance to outside help within healthcare organizations is generally found today. This culture drives a premature and false conclusion that if you are not from healthcare, you don't have anything to contribute.

While there are pockets of excellence and they are growing in number, many in healthcare will dismiss outside attempts to help, content to practice as they have been until forced to change from within.

Barry Chaiken, M.D., said:

> If we continue to approach the problem the same way, looking for some silver bullet, we can only expect the same outcome. Therefore, it is time for us to try something new.
>
> A comprehensive approach to healthcare reform is necessary. Everyone, including physicians, nurses, patients, administrators, and insurers, must work together to form the solution.
>
> Continuing to approach illness and deliver care the same way we have been doing for decades is sure folly. Physicians and nurses must begin to see their responsibilities in a different light and begin to do their tasks differently. Administrators and insurers must assist and incent them. Patients must take responsibility for their care and work to prevent illness rather than wait passively for resource-intense medical miracles to fix them. Physicians must direct care and prescribe therapies according to science and rational thinking rather than habit and personal preference.[18]

Note this includes a role for patients. Quality practitioners from all sectors should be the first among patients to accept this challenge and take it even further. ASQ's Automotive Division recently mobilized volunteer quality coaches to work with interested healthcare organizations on process and quality improvement.

Chaiken actually forgot one critical player and its potentially helpful role: the organizational purchasers of healthcare services, such as the U.S. automotive Big Three. These organizations could help break the gridlock by either requiring an independent management system, such as the BOS certification of healthcare plans and providers. Or, the purchasers could at least make certification a preferred supplier credential.

Healthcare has independent clinical accreditation programs, but these have not produced the desired result. As Chaiken said, we need to try something new. The BOS certification would generate momentum in the sector toward real improvement in cost, quality and patient safety.

JAMA adds, “Researchers suggest that to affect change, data should be collected and mapped to provide healthcare professionals with a clear understanding of how often hospital-acquired infections, for instance, occur per year and how much those infections and their subsequent treatment add to the direct and indirect costs of healthcare.”[19]

Data collection and analysis

This type of data collection and analysis is fundamental for quality practitioners. Data can be effectively used to persuade healthcare practitioners to acknowledge what must be done to improve. To sustain the gains and drive continual improvement, quality practitioners should help organizations implement a management system, such as BOS.

A significant, sustained grass-roots and concerted effort to drive quality proactively into healthcare is needed. If you are a quality practitioner, the nation’s healthcare delivery sector needs your time and expertise.

In my previous column in QP’s November 2007 issue, I described the AIAG BOS document in some detail and suggested that the use of standards like BOS need to be integrated into undergraduate college curricula. Business and quality management science should incorporate lessons from industry.

In late January, the ASQ Healthcare Division launched a Quality Education in Healthcare Committee with more than 60 volunteers to address issues including:

- What healthcare content should be in Quality 101 type introductory lessons for all healthcare professionals?
- What content should be in more comprehensive advanced programs?
- What are the best ways to influence new students throughout the health professions, and what are the best ways to support continuing education of working professionals?
- Should ASQ remain just another provider of educational materials and courses, or become the accrediting body for academic programs in quality offered by other institutions?
- Is certificate-level training of technicians sufficient, or is an applied graduate degree for professionals the more appropriate credential for leaders?
- How can ASQ best serve members of its Healthcare Division who are engaged in education through schools of laboratory technology, medicine, nursing, public health and others?
- What type of relationship should ASQ foster with secondary and postsecondary institutions?

Call to action

As this issue of QP was going to press, this committee was developing initial recommendations. Much work lies ahead in getting appropriate curricula into education. Perhaps you have experience that can help the committee with this work.

Consider this column a call to action, with several opportunities to serve listed. There are others. The healthcare sector needs you. Quality practitioners need each other to respond to this challenge. Get involved today—the life you save might be your own.

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R. Dan Reid, an ASQ fellow and certified quality engineer, is a purchasing manager at General Motors Powertrain. He is co-author of the three editions of QS-9000 and ISO/TS 16949; the Chrysler, Ford, GM Advanced Product Quality Planning With Control Plan; Production Part Approval Process *and* Potential Failure Modes and Effects Analysis *manuals; ISO 9001:2000; ISO IWA 1; and the new* AIAG Business Operating Systems (BOS) for Health Care Organizations *(HF-2).*

MORE ONLINE

For more feature articles on the expansion of the quality movement in the healthcare, education, government and service sectors, go to www.qualityprogress.com.

BY CRAIG A. NIEMANN

A Clearer Picture With RCA

Root cause analysis is vital to an effective quality assurance program

THE FIRST PART of this two-part article described how to lay the right foundations for an effective improvement-based quality assurance program (QAP) in a calibration laboratory (March 2008, p. 52).

Embracing the philosophy, choosing the sampling method and selecting the right personnel to manage the QAP laid the groundwork and set the stage for its success.

The next step is conducting root cause analysis (RCA) to examine the individual nonconformities, and then periodically performing trend analysis to determine the most significant nonconformities along with the associated root cause.

The aforementioned steps, in conjunction with the right foundations, should put your calibration laboratory on the road to a process-based approach to improve laboratory operations and manufacture a better product for the customer.

Don’t forget your code

Using a system of codes to classify the nonconformity and the associated root cause will help in analyzing data and will assist management in determining and correcting the most significant trends in the laboratory. But be careful not to dilute the data by making the codes so specific that management cannot identify any laboratory trends.

For example, one nonconformity might have the wrong date on the calibration certificate, while another might have incorrect charted values—two different errors, but both relate to documentation. Many of the classifications will end up being a best-fit scenario instead of something that accurately describes the nuances of the individual nonconformity. Like the choice of how to sample the end-of-the-line product, this is laboratory and workforce dependent.

Effective RCA is a significant milestone in the development of an improvement-based system and is probably the hardest to achieve. Nobody likes to be told they are wrong, so QAP personnel need to make sure the focus is on the process and not the person.

This will help establish an open and honest atmosphere during investigation of the nonconformity. After all, the ultimate goal of an effective QAP is to prevent a recurrence of nonconformities. An effective RCA can make that happen.

Enter the observatory

The first step in conducting RCA is to gather data, which can be done effectively by observing the technician recalibrate the item or perform the suspect process without divulging the nonconforming condition. There are many things quality personnel can and should look at to determine whether an item has a quality nonconformity. A few questions to ask are:

- Is the item safe to use?
- Does the item have any physical defects that affect operation?
- Does the documentation have any discrepancies that affect quality?

Depending on the nonconformity and the unit being tested, QAP personnel can have the technician perform the entire calibration or just the measurement functions that did not meet required tolerances. The RCA process is enhanced if the technician repeats the normal calibration process as closely as possible. This will help determine why the out-of-tolerance condition occurred.

The technician might have used a different standard or substituted methods resulting in a faulty in-tolerance reading during calibration. This is one reason QAP personnel should not assume too much when they discover what appears to be a nonconformity. There is a possibility the unit is actually within specifications and the reviewer is performing the step incorrectly. Everyone is human, QAP personnel included.

> “Effective RCA is a significant milestone of an improvement-based system **and is probably the hardest to achieve.**”

Ideally, observation of the technician performing the calibration will answer why the nonconformity occurred, but this is not always the case. Conducting a preliminary RCA session immediately after the technician performs the process will help focus the efforts of data collection for the RCA meeting. Data such as item reliability, calibration procedure changes and reliability of the calibration standards might yield insight to the true root cause and enable a more effective corrective action.

Talk it over

Once all the needed facts are gathered, an RCA team consisting of the technician, supervisor and a representative from the QAP should meet to discuss the nonconformity, nail down the root cause and come up with a corrective action.

> **The technique used** is not as important as **the conclusions reached** by all of the stakeholders.

Because time can make memories fade, the RCA meeting should be held as soon as possible after the discovery of the nonconformity.

At the meeting, the QAP representative should act as facilitator to keep the team focused on process improvement instead of placing blame. All the work done so far is wasted unless technicians, supervisors and QAP personnel find a way to look at the nonconformity objectively and determine the root cause.

Several different techniques—such as five whys, cause and affect diagrams, and brainstorming—will help the team reach logical conclusions and discover the root cause of the nonconformity. In the end, the technique used is not as important as the conclusions reached by all of the stakeholders. It is critical that the RCA team identify the reason for the nonconformity and develop effective corrective action.

Just as consistency is important when identifying a nonconformity, it is also important in RCA. When the team members identify what they think is the root cause, QAP personnel should make sure the root cause classification is consistent with previous decisions made as part of the QAP. Otherwise, management will use flawed data during trend analysis and will not be able to attack the most prevalent root cause.

It might help the RCA process to keep key leadership personnel separate until everything is complete and a corrective action is ready for implementation. Leadership should review all the documentation as a last sanity check.

Some teams can lose focus during the RCA meeting and end up attacking the symptom of the nonconformance as opposed to the root cause. A final review of all the documentation by leadership should prevent this.

Personnel should also beware of checklists. If your technicians are required to follow a checklist when calibrating items, do not turn the list into a dumping ground for every corrective action. Some checklists tend to be a two-sided, single-spaced document in eight-point font. An extensive checklist ceases to be a useful tool and becomes something the technicians pretend to follow only when someone is watching them.

Follow the trends

Trend analysis is the final step in a truly effective, improvement-based QAP. On a regular basis, management needs to review all the data collected by the QAP to look for nonconformity and root cause trends. Then it needs to come up with effective solutions to try to correct the most prevalent trends.

The focus of a trend analysis meeting is the bigger picture or macro-level view of the laboratory, similar to a management review. The QAP, in concert with the technicians and supervisors, will correct the individual nonconformities, so it's important not to get hung up on the corrective actions for each one.

Instead, look at the data collected by the QAP and use your imagination. It might help to have a standard breakdown of the data for every trend analysis session. That way, it is easy to see whether the previously applied corrective actions are having any effect.

After the standard breakdown, you are limited only by your imagination. For example, on which day of the week do most nonconformities occur? When breaking down that data, you might come up with Wednesday as the biggest day for nonconformities, not Monday or Friday as originally suspected.

Other things you can look at are the skill level, bad actors and calibration areas with the most errors. This process can and must be tailored to the workforce at your laboratory.

In addition, it is important to review the corrective action from the previous trend analysis meetings. You will find that some of the applied corrective actions have no effect. If that's the case, management should evaluate whether it wants to continue to spend the resources and adjust the corrective action or just abandon it all together.

Lastly, strive to make your corrective action SMART—specific, measurable, attainable, realistic and timely. Try to avoid corrective actions such as merely briefing the technicians, which in the long term will not curb current nonconformity or root cause trends. Stick to SMART actions, and an improvement-based QAP can lead to better processes and products.

CRAIG A. NIEMANN is a senior master sergeant with the U.S. Air Force stationed in Heath, OH, and has served as a quality process evaluator and quality program manager. He received his associate's degree from the Community College of the Air Force in 1997. Niemann is a senior member of ASQ and a certified calibration technician.

TAKE UP THE CAUSE

If you have other helpful hints that can lead to a successful root cause analysis, please post them on QP's website at www.qualityprogress.com, or e-mail them to editor@asq.org.

BY RAY HARKINS

Uniquely Prepared

TV, billiards and Dale Carnegie mold a career in quality

BEING THE quality manager of a plastics extrusion and fabrication company for the last eight years has required large shares of technical savvy, people skills and hard work. The experience and skills I've gained in the trenches have been invaluable, and the help from people who have supported me has been priceless. I believe, however, that my unique preparation for filling such a role has been the most valuable of all.

My first exposure to the quality and testing field came as a youngster in my parents' living room while watching "Fight Back," a late-night television show, with my father.

We would tune in each week to watch the host, David Horowitz, take on big corporations that were delivering shoddy products and services to their customers.

My favorite segment was the "commercial challenge," when Horowitz would duplicate the test conditions shown in a product's television commercial, attempting to get the same fantastic results.

One by one, from Timex to Krazy Glue, Horowitz either verified or disproved each company's outrageous claims. Even as a young teenager, this program sparked my interest in product design and evaluation.

Creative courses

The seeds of a future career in engineering began to blossom in a drafting course I took during my sophomore year in high school. My instructor had a knack for coaxing excellence from his students. Learning the fundamentals of mechanical design and drafting came naturally to me. I was fortunate to attend a high school that offered two years of mechanical drawing followed by a third year of architectural design.

CARE TO SHARE?
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This design experience, coupled with college prep math and science courses, helped provide a seamless transition into the technology program at the University of Akron. There, I expanded my understanding of engineering and design principles.

Among the more important quality concepts I learned in college were accuracy, precision and repeatability. I did not, however, learn these concepts in my quality assurance class, but across campus in the student center's game room. I discovered the facilities, which were equipped with 16 tournament-size pool tables, during my very first weekend as a college student. I immediately became fascinated by the science and art of billiards.

Advanced billiards players possess a natural understanding of many physical phenomena, including momentum, reflection and friction. To an engineering student like me, the pool table became a physics lab, where precise actions and their accompanying reactions were executed and studied over and over again.

In my senior year, I won the university's eight ball championship and represented Akron at the regional tournament of college champions. My days of playing pool are long over, but the lessons I learned while chalking up were fundamental to my understanding of the mechanical world.

Learning from the best

I also learned about relating to other people, not just through day-to-day experience, but also through Dale Carnegie's techniques in his bestselling book, *How to Win Friends and Influence People.*[1] My father worked as a retail manager in the 1960s and often shared with me the practical insights he gained by attending

> To an **engineering student like me,** the pool table became a **physics lab.**

company-sponsored Carnegie workshops.

A college friend lent me a copy of Carnegie's classic, which I read in just a few days. Through this book, Carnegie taught me that every person is truly valuable, unique and worthy of appreciation, and that by taking a sincere interest in the lives of those around you, your own life becomes vastly richer. These lessons proved to be essential not just to a career in industry, but also to my life as a whole.

After graduating, I spent six years working for a wire harness manufacturer as a production supervisor and manufacturing engineer. Like many young adults, I learned how little I really knew. I'm thankful for the people I met early in my career who were willing to share their experiences and knowledge with me.

Following a one-year stint at a struggling metal stamping plant, I found my way into my current quality management position. Even though I had never worked in quality or in plastics, the role fit me perfectly.

I owe my career success largely to my superiors who can see and interpret through a broader lens than I could and to a loyal staff who are committed to excellence in the workplace. I believe in being faithful to the small things, truly respecting other people and learning as a goal for a lifetime.

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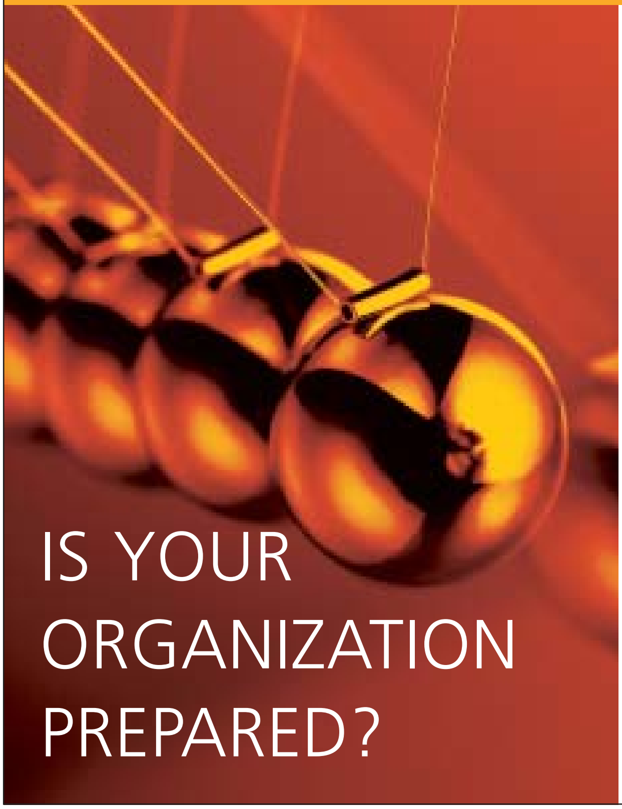
RAY HARKINS is the quality manager of Mercury Plastics Inc. in Middlefield, OH. He earned a bachelor's degree in engineering technology from the University of Akron. Harkins is a senior member of ASQ, and an ASQ certified quality engineer and calibration technician.

Business Continuity Management



Continued operations in the event of a disruption, whether due to a major disaster or a minor incident, are fundamental requirements for any organization.

Over the last few years, our country has experienced a number of natural disasters and deliberate events that have interrupted many companies' abilities to sustain daily operations. Business Continuity Management is an evolving discipline that allows you to manage and measure this critical subject.

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CAREER CORNER BY RUSS WESTCOTT

Do You Deserve a Raise?

Eliminate the 'I' and focus on your value to the company

THERE ARE A MILLION-and-one reasons you might think you should be paid more. Perhaps:

- Your coworker just got a raise.
- You learned that your CEO earns 10 times what you do.
- Your debt is steadily increasing.
- Your spouse bugs you to ask for a raise.
- A new person is hired at the same salary as it took you 12 years to reach.
- The company is making lots of money, but the pay is a lot less than a comparable job with the competition.

- It's been two years since you got a raise.
- You can't afford a vacation or new high definition TV.

Are these legitimate reasons for expecting your boss to give you a raise? Maybe they are reasonable to you, but are they a rationale for a boss's business decision?

Think about it. All these reasons are aimed at providing a benefit to you. A business decision is based not only on what you have done for the company in the period since your last raise, but also on what you will do going forward.

Language of management

Quality professionals hear over and over that they should speak in the language of management. Management is measured on its contribution to the company's profitability. What have you done recently to enhance the boss's metrics (your current worth to the company), and what contribution to those metrics will you provide in the foreseeable future?

In plain language, base your request on the favorable return on investment your past contributions have made and the value of your anticipated future contributions. It's not all about you; it's about your value to your company. Giving a salary increase is a business decision, not an emotional response to your real or imagined personal needs.

You know what your worth was when you were hired and should be able to document the value of your subsequent contributions.

If you are able to project a return on the company's investment in you that clearly substantiates your salary and benefits (perhaps a three to one ratio, or better), this is an economic case for continued investment in you, as well as an indication of the loss to the company should you choose to leave.

Do's and don'ts

Approaching your boss for a raise requires facts, confidence, clarity and sensitivity.

Do your homework: Know what metrics your boss is measured by, the financial status of your company, the factors in the external environment that are impacting the company, your personal worth to the company (past, present and future) and how your personal development and growth relates to the company's strategy.

Understand your boss as well as you can: Know his or her history with the company, predominant management style and perceptions of you and your performance.

Know what drives your boss, and determine the best time to approach him or her. Avoid times when your boss is distracted by other serious management or operational issues or is in a bad mood. Even the time of day might be important.

Understand the company guidelines on compensation: This should include your boss's constraints on salary decisions, your salary range, where within that range your current salary lies and what might justify your boss to bypass the guidelines. Try to learn the typical raises your peers received (this might be tough to find out).

Know when salary decisions are made and, if possible, plan your request after receiving a positive performance appraisal. Carefully choose the salary you will request and be ready to explain how you arrived at that figure, excluding any personal needs.

Fine-tune your behavior: Don't

NEED CAREER ADVICE?

If you have a career or job search concern of broad interest, write to editor@asq.org. We'll ask one of our expert "Career Corner" columnists to write about the subject in an upcoming issue.

Don't brag about your accomplishments, but instead simply **present them factually.**

demand, beg or seek pity. Don't play the "I need" card. Don't brag about your accomplishments but instead simply present them factually. Don't approach the discussion as if it is a problem—present your case as an opportunity. Don't threaten to quit if you don't get a raise.

Be prepared

Do bring examples of how you have contributed to the company's profitability—and imply how you made your boss look good.

To issues such as salary freezes, economic squeezes, hostile takeover fights, outsourcing or downsizing, respond as if they represent an opportunity for you to excel in contributing to the company's strategy.

If you are at the top of your salary range, be prepared to demonstrate how you exceeded guidelines and added value. Better yet, detail responsibilities that could be added to your job and qualify you for a higher range.

If you fail to get an unqualified "yes," then negotiate a near-term revisit of the request, and try to get the boss to be clear on what you could do to make his or her decision easier.

If you've diligently kept documentation of every project, procedure and system in which you contributed, you have a factual base on which to present your economic case for a raise.

Remember that not needing this raise (or at least not stating your need) gives you power in your negotiation.

Use the negotiating concept of triangulation: I'm here, you're there, so how do we get to an agreement acceptable to both of us?

RUSSELL T. WESTCOTT is an ASQ fellow, certified quality auditor and certified manager of quality/organizational excellence. He is editor of the third edition of the CMQ/OE Handbook, *co-editor of the* Quality Improvement Handbook *and author of* Simplified Project Management for Quality Professionals *and* Stepping Up to ISO 9004:2000. *Westcott is also an instructor of the ASQ CMQ/OE refresher course. Based in Old Saybrook, CT, he owns the Offerjost-Westcott Group, a work-life planning and career-coaching firm.*

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STATISTICS ROUNDTABLE

BY RONALD D. SNEE, ROGER W. HOERL AND ANGELA N. PATTERSON

In With the Right Crowd

Getting management on board to support statisticians' roles

FIRST, THE GOOD NEWS. The importance of statistics related to the way the world does business has never been greater:

- Large-scale statistical training through improvement initiatives like Six Sigma has spread statistical thinking, and it has become common in fields such as finance and healthcare.
- Commercial statistical software puts the ability to do complex statistical calculations on the desktops of managers and executives who neither have nor need specialized statistical expertise.
- About half a million students each year take a general introductory statistics course in college in the United States.
- The web puts vast storehouses of statistical information at everyone's fingertips.

Now, the bad news: The statistician and quality professional might become the proverbial middle men who get cut out by these advances.

Consider the plight of travel agents. When was the last time you booked an airline ticket or hotel reservation through a living, breathing travel agent? Why should you when it's easier and cheaper to do it yourself using powerful web based programs that can instantly scour the universe for the best deals? Using the business term for "cutting out the middle man," travel agents have been "disintermediated."

Statisticians run a similar risk unless they find a way to break out of their traditional roles. During the past 40 years, much of the work done in corporate statistics groups can be described in two ways:

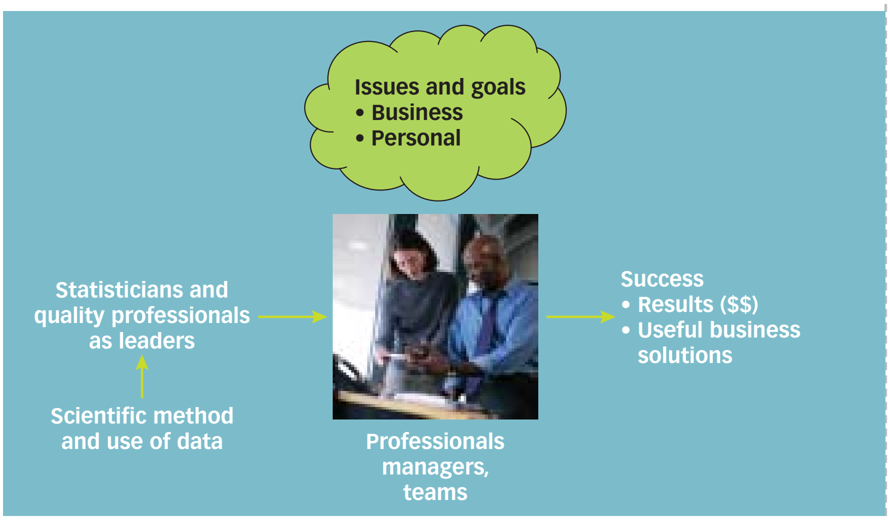
1. Performing technical tasks, such as analyzing data and designing experiments at the request of someone directing a project.
2. Advising others how to attack a statistical problem.

These types of activities have typically been referred to as statistical consulting. In the days before all of the good news, this role of enabler made sense. Corporate statistics organizations grew comfortable in this role, "owning" the organization's statistical methods. As a result, statisticians came to be viewed as narrow specialists, such as accountants or lawyers, and as passive consultants rather than equal members of business teams.

It's a precarious position. You can no longer own statistics when anyone with a computer can download and use statistical software. Further, narrow technical tasks can easily be moved to low-cost countries, and many cost-conscious businesses are asking why their people can't analyze data themselves.

As demand for statisticians' traditional services dries up, statisticians must move from the role of passive consultant to active colleague. In other words, they must do what travel agents have so far failed to do: find a way to add significant value in the face of developments that have made their traditional services widely available for free.

The world of statisticians and quality professionals / FIGURE 1


Issues and goals
• Business
• Personal
Statisticians and quality professionals as leaders
Scientific method and use of data
Professionals managers, teams
Success
• Results ($$)
• Useful business solutions

Think marketing

There are two compelling reasons for statisticians to become active partners, particularly with managers. One of those reasons is opportunistic and the other idealistic. When the infamous bank robber Willie Sutton was asked why he robbed

Statisticians must move from the role of **passive consultant** to **active colleague.**

banks, he said. "Because that's where the money is."

Managers control the resources of time, money, personnel and equipment. They are where the action is—setting direction, goals and objectives—and if you want to be in on that action, you need to do far more than regard managers as a distant end-user of your services.

The idealistic motive comes from the convergence of your vocational ideals and values with theirs. Managers are responsible not only for the day-to-day running of the business, but also for improving the way work gets done. Like the best statisticians, the best managers want to help people succeed. They want to see process performance improve and data based approaches and scientific management really work. In realizing those goals for the organization, managers want to fulfill their personal goals.

How do you create opportunities to work more closely with managers? Think marketing. Like a veteran marketer, you must first identify your customers and their needs. Where is the value you can add to make the most difference—in manufacturing, supply chain and distribution, or in a particular division, department or discipline? Which managers in the area you have identified possess the requisite resources and authority to bring you on to a project?

But before you propose to help, determine exactly what needs those managers and departments have in terms of critical issues and operational, financial and corporate objectives.

You can do this by interviewing managers about their goals and the challenges that keep them awake at night. Also, interview the managers' colleagues for their perspectives. This intelligence, combined with your knowledge of the company's objectives, should enable you to see a clear picture of the needs of potential partners.

Once you understand a potential partner's needs, then you can (again, like a marketer) create your value proposition, which details the benefits you can deliver at what cost. In creating your value proposition, be sure you can deliver what you say you can. In fact, you should underpromise and overdeliver.

For example, based on your background in finance, you might realize your company is not getting the best possible return relative to the risk it is taking when investing in a particular portfolio. Rather than lecture people on the use of statistics, you are more likely to succeed if you develop an overall value proposition that quantifies the types of returns that should be possible, relative to the risk appetite of the business.

Once you get people's attention with this high level analysis, you could then develop a more detailed business case—tailored to a specific manager—outlining a conservative estimate of the increased returns, level of effort and resources that would be required, and the general timeframe of implementation and financial return.

It would be most effective to couch this analysis and recommendations in the standard terminology and metrics of the business, such as return on investment. Simply put, the value proposition and business case enable the manager to decide whether your services are worth it.

Working with managers

Not all managers are alike. In seeking out managers to ally yourself with on proposals or projects, you will find at least four common types:

1. Low-risk managers think small, avoid outside help to keep the budget down and avoid rocking the boat at all costs.
2. The resisters come up with infinite reasons why your proposal won't work, always know a better way and don't really want help.
3. The do-it-yourselfers gladly accept all the help they can get and take all the credit they can.
4. The collaborators want help, appreciate everyone's contribution and will challenge and reward you throughout the course of a project.

During your career, you will likely work with all four types at one time or another. It goes without saying that the collaborator is the most desirable type to work with. But even beyond the collegiality of the collaborator, the ideal manager will have some additional attributes:

- A significant need for your help.
- Adequate funding and a willingness to spend it.
- An appetite for leading change.
- A desire for a win-win relationship.

In addition, the ideal manager will exhibit the qualities of loyalty, trustworthiness and high integrity that inspire

REINVENT YOUR ROLE

Have you faced similar challenges at your workplace? How did you break out of the traditional statistician role? Share your experiences at www.qualityprogress.com, or e-mail them to editor@asq.org.

everyone on the team.

Unfortunately, not all managers are ideal or even collaborative. Further, not only are all managers different, but they are also not equal—some have more power than others. Therefore, to find your way to the most beneficial alliance—for you and the organization—you should thoroughly understand where real power resides. Who are the movers and shakers with influence to command resources (including you) and to lead or initiate the kind of projects to which you can add value? Such knowledge of the real dynamics of the organization is power, but it also

CLICK WITH MANAGERS

It is unlikely you will match well with every manager. Personal chemistry with a colleague is mysterious. Nevertheless, once you have made a compelling case for your participation in a project, there are some useful principles you can adopt to help the relationship with the manager succeed:

The manager is the boss. In all likelihood, you sought out the manager, not the other way around. And even though you might have been included on a project because you proposed it or demonstrated how you could add value to an existing activity, that doesn't mean you are in charge. Even the most collegial managers will expect to call the shots, because they are ultimately held accountable for results.

Money is the language of management. You must be able to help translate process and operational improvements into financial results. What will shorter cycle times, the eradication of root causes of problems or a reduction in process variation mean in terms of faster speed to market, increased equipment uptime and higher productivity? And what will those improvements mean to the top or bottom lines?

Deliver useful results and information. Advertisers long ago figured out that consumers are interested in the benefits of a product, not its features, no matter how impressive. Similarly, managers don't care about the complexities or technicalities of your statistical analysis; they just want information they can use to be successful.

Focus on their needs, not your brilliance. That means developing your skills clearly and concisely presenting statistical studies to managers.[1]

Challenge, don't attack. Think of yourself as a thought leader who has a unique perspective. Adding that perspective might involve disagreeing with the manager, but do it dispassionately and in a spirit of mutual inquiry. Be especially on guard against trying to dominate or win by high-handedly invoking statistical arcana that only you understand.

Get to know the managers. Understand their issues and concerns and the unique pressures of their jobs. For example, senior managers have different needs than middle managers. They are typically more focused on business results and less on operational specifics.

Middle managers have the toughest jobs of all. They must balance direction from above with the realities of getting the work done. Remember, too, that managers are complex people, and you should try to get to know them from those perspectives as well.

Deliver bad news thoughtfully. Because of the predictive and analytical power of statistics, it often falls to the statistician to be the first to understand that something won't work or isn't working as planned. In delivering bad news, take care not to give the manager ammunition to shoot the messenger and ignore the message.

Always review your conclusions with the manager before presenting them to a wider audience. Be sure your conclusions are based on rock solid, clearly articulated analysis. Don't merely present the problem, but whenever possible offer a potential solution.

Fulfill the opportunity. Focus on solutions and results, not on methods. The idea is to make a difference, not showcase a discipline. Always strive to deliver results in scope, on time and within budget.

Share the success story together. Join managers in publicizing the results of a successful project, inside and outside the organization. Invite managers to co-author articles and speak at meetings and conferences.

Help the manager succeed beyond the scope of the project. Little things mean a lot. For example, you can pass along articles and books relevant to the manager's needs and interests.

You can provide the manager with useful intelligence about your discipline and the organization. Big things mean even more: suggesting high-performing job candidates, performing above and beyond the call of duty, and identifying additional opportunities. *—R.S., R.H. and A.P.*

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can mean making hard choices: working with a credit hogging do-it-yourselfer manager with real power versus a collaborator manager with little leverage in the organization. See the sidebar “Click With Managers,” for tips on making your relationships with the managers succeed.

Look to **assume broader,** more consequential roles such as **project or initiative leadership.**

Working with teams

Of course, most significant projects involve not just one-on-one relationships with managers, but also entail work with teams. If your role has been primarily consultative in the past, then working as an integral part of a team outside your department might be a relatively unfamiliar experience. Like work with managers, teamwork requires some skills beyond purely technical statistical ability.[1, 2]

Your statistical expertise, however, is part of what got you on the team. You have the opportunity to help the team put statistical thinking to work and to make sure the team gets the maximum value from data and statistical techniques.[3]

You should therefore promote a standard problem solving approach, such as define, measure, analyze, improve and control (DMAIC) that systematically structures data-driven techniques.[4] Simply resorting to data in an ad hoc fashion greatly diminishes the power of statistical methods and the value you can bring to the team. By contrast, frameworks like DMAIC enable the team to build successively on each stage of its work, use statistical methods to get at the root causes of problems and solve them once and for all.

During a project, there might be teachable moments. These times are when you can educate the group about precisely how statistical thinking can solve the problem at hand and similar problems that might arise in the future. But don’t play the role of expert witness or use statistical jargon to intimidate or dominate other team members.

Remember, too, that you are trying to help the team find the best business solution, not the best statistical solution. Certainly, as the team’s primary interpreter of data, you are in a position of power, but you should use that power responsibly and diplomatically.

Participation as an equal team member also requires additional skills.[5-7] You will need an understanding of group dynamics and the ability to facilitate and manage team meetings. You should also be able to teach statistical principles to nonstatisticians in a way they can understand and put to practical use.

You should possess general business understanding, especially of finance, as well as a specific understanding of your company’s business: its markets, customers, strategic objectives and key success factors.

As you acquire or exercise these skills and gain additional trust and authority from managers and teammates, look for opportunities to assume broader, more consequential roles, such as project or initiative leadership.

In summary, successful collaboration with managers and teams results when you:

- Learn about the subject, issues and business of the client group.
- Focus on helping people be successful by delivering results and positive financial impact for the organization.
- Provide the best business solution, which might not be the optimal statistical solution.
- Promote the scientific method and the effective use of the right data.
- Move from a consulting mind-set to a collaborative, leadership mind-set.

Insofar as you put these principles to work, you will succeed in transforming yourself from a merely nice-to-have resource to a valuable must-have colleague, thought leader and change agent.

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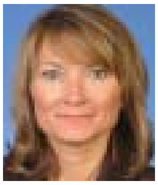
RONALD D. SNEE is principal of performance excellence and lean Six Sigma initiative leader at Tunnell Consulting in King of Prussia, PA. He has a doctorate in applied and mathematical statistics from Rutgers University in New Brunswick, NJ. Snee has received the ASQ Shewhart and Grant medals and is an ASQ fellow.

ROGER W. HOERL is manager of General Electric’s corporate applied statistics lab. He has a doctorate in applied statistics from the University of Delaware. Hoerl is an ASQ fellow, an ASQ Brumbaugh Award recipient and a GE Global Research College fellow.



ANGELA N. PATTERSON is a member of General Electric’s corporate applied statistics lab and a certified Six Sigma Master Black Belt. She has a doctorate in applied statistics from Virginia Tech, where she is an adjunct faculty member. Patterson is a member of ASQ.

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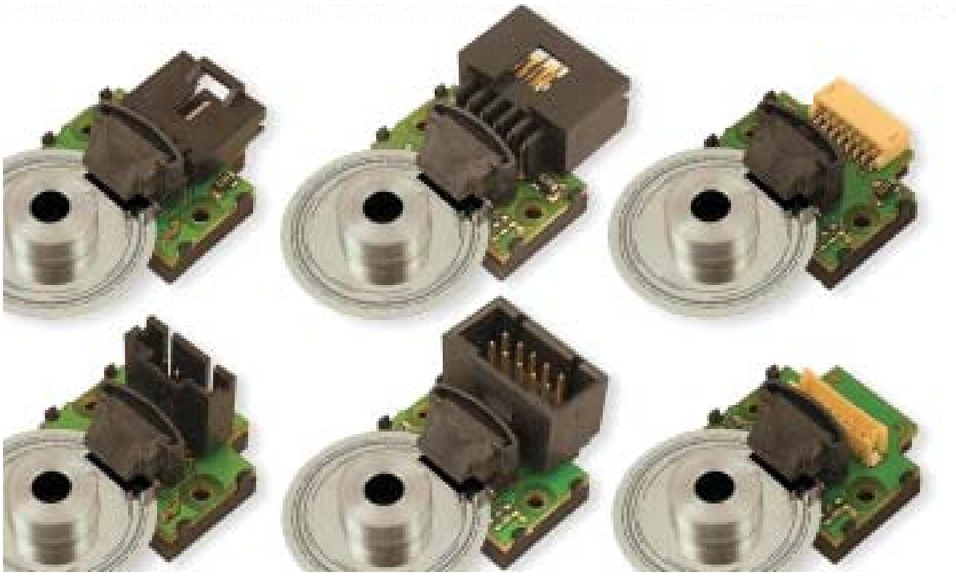
Renco Encoders' RE200 series encoders provide six different connector configurations with a variety of output options.

The RE200 series encoders use industry standard connector systems with integral locking features. Each connector option comes in radial or axial orientation.

The RE200 series encoders provide single ended A and B channels with reference marks in resolutions up to 4,096 using a 1 in. code disk. Line driver outputs are also available. The RE200 series can be customized if the available options do not meet initial requirements.

Call: 805-968-1525; visit: www.renco.com.



Ultrasonic detection system ▼

The Ultraprobe 3000, an ultrasonic detection system from UE Systems, uncovers energy waste and helps plants reduce their carbon footprint.

The Ultraprobe 3000 will impact energy conservation by locating compressed air, steam trap leaks and faulty steam traps.

The digital instrument has a 16-segment bar graphic display panel that shows sensitivity level, storage location, storage location number and battery level.

Other features include scanning and stethoscope modules, noise isolating headphones, calibrated decibel readout, rubber focusing probe and a storage entry area.

Call: 914-592-1220; visit: www.uesystems.com.

Process analyzer

Waters has released the PATROL UPLC process analyzer. The PATROL UPLC is a real-time process analytical technology system that detects and quantifies complex multiple component manufacturing samples and final products on the manufacturing floor.

The PATROL UPLC provides reproducible quality control laboratory capabilities such as automated purity and yield results, automated sign-off and real-time release. The PATROL UPLC integrates and automates sample preparation capabilities, liquid chromatography instrumentation, column chemistries and process control communication interfaces.

Call: 508-482-2614; e-mail: brian_j_murphy@waters.com.

Machine vision camera

The CS3970CL machine vision camera from Toshiba Teli is designed for original equipment manufacturing industrial vision applications such as precision gauging, alignment, character reading and fine defect inspection on very small parts.

The CS3970CL captures full frame images at up to 15 frames per second using a 1/1.8 progressive scan charge-coupled device. This is ideal for highly detailed inspection of fast moving objects. Frame rates can be increased using the camera's optional partial scan and high speed draft modes.

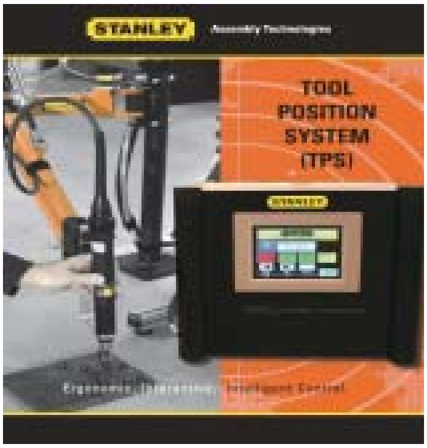
Call: 949-770-8354; e-mail: doug.freck@ttai.toshiba.com.

Tool position system ▼

The Tool Position System (TPS) from Stanley Assembly Technologies uses position monitoring technology to monitor an assembly tool location and set specific control parameters for each fastener.

TPS is available for articulating arms from 10 Nm to 4,000 Nm. A sequence of fastener positions can be programmed to ensure assembly to specifications. A socket-try option enables different bolt sizes in a sequence. Other features include a color touch screen, an interface to auxiliary devices and up to 50 part patterns.

Call: 440-229-9573; e-mail: jjerdonek@stanleyworks.com.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Mini conveyor ▶

FKI Logistex's Mini-Unscrambler conveyor orients cases into a single file line at up to 100 cartons per minute for induction into high speed material handling systems.

By edge aligning cartons and removing side-by-side products, the Mini-Unscrambler reduces system jams and missorts and decreases carton recirculation.

Cartons delivered in single line orientation can reduce gaps, minimize scuffing and allow for a range of products. The standard length of the Mini-Unscrambler is 15 ft.

E-mail: martin.clark@fkilogistex.com; visit: www.fkilogistex.com.

Low profile accelerometer ▲

Wilcoxon Research has introduced the 787F, a low profile accelerometer featuring a side exit and integral cable. The 787F accelerometer's integral cable is permanently mounted, eliminating the concern that contaminants can penetrate the connector.

Dirt, oil, grease, water, dust and other contaminants found in harsh industrial environments can cause an electrical short, erratic or erroneous readings and corrosion.

The low profile sensor is designed with a side exit connector and captive screw for easy installation in confined areas.

E-mail: wilcoxon@meggitt.com; visit: www.wilcoxon.com.

Viscosity sensor

SenGenuity's ViSmart viscosity sensor provides immediate sample and continuous, real-time, in-process viscosity measurements for embedded, inline environments that require high resolution and accuracy in low to midrange viscosity fluids.

The ViSmart sensor uses semiconductor technology, has no moving parts and is sealed for complete immersion. It is unaffected by vibration or flow conditions and does not need field calibration.

The ViSmart sensor measures the viscosity of a range of fluids and is rated for temperatures up to 125° C. The ViSmart sensor can be customized for specific industry applications and process requirements.

Call: 603-578-3052; e-mail: bholbrook@vectron.com.

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QPREVIEWS

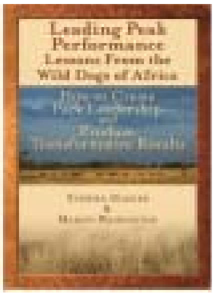
Leading Peak Performance

Stephen Hacker and Marvin Washington, ASQ Quality Press, 2007, 128 pp., $31.50 list, $18.90 member (book).

On the plains of Africa, the cheetah is the fastest, and the lion is the strongest. In this competitive environment, however, the African wild dogs are the most successful hunters. Packs of wild dogs are able to successfully kill prey that is larger and stronger than the individual dogs. The authors describe the dynamics in the pack that contribute to this success:

- Pack leadership.
- Pack vision.
- Individual contribution.
- Tenacity.

To illustrate how wild dog behaviors can be employed to achieve success in human endeavors, the authors use case studies on topics ranging from explorers of Antarctica to basketball teams. They provide evidence that creating a team of empowered individuals with a shared vision is an organizational model with great potential for success.



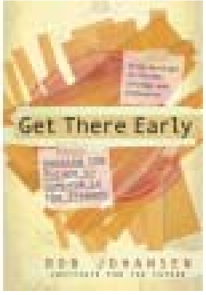
The authors describe the components of the transformational leadership model and the skills required of a transformational leader to create a "wild dog" culture within an organization. They touch lightly on the subject of personal and organizational transformation; however, more information is available from the numerous books and articles on this subject written by Hacker.

This book presents a strong case for transforming organizations into cohesive packs and will whet the reader's appetite for more information on the transformation process. It shows how a team of empowered individuals who support one another and are aligned to achieve the group goal can become a powerful force on the African plain or in the modern marketplace.

Reviewed by Rich Anderson
Tucson, AZ

Get There Early

Bob Johansen, Berrett-Koehler Publishers, 2007, 258 pp., $27.95 (book).



In this offering, the author illustrates how we live in a volatile, uncertain, complex and ambiguous (VUCA) world, and then shows how to deal with the difficulties of VUCA by using foresight, insight and action to develop vision, understanding, clarity and agility.

The first part of the cycle as outlined by Johansen is to forecast meaningful scenarios that could occur in the next 10 years. The second step is to make sense of the dilemmas identified, and the third is to construct positive responses to address them. The goal of the sequence is not necessarily to be correct, but to enable better decision making.

This book provides an eye-opening look at the future of any organization. The pace of change is rapid and accelerating. Knowing which trends to pay attention to or respond to is obviously an advantage. Anyone with planning responsibilities, especially long range, should read this book while keeping in mind that quick realization will be difficult. The techniques provided take practice, experience and discipline to achieve meaningful results.

To get started, a chart provided on the inside of the book jacket illustrates the Institute for the Future's forecast for the next decade, which includes the driving forces affecting people, practices, markets and places. The author also provides excellent notations, references, bibliographies and indexes to help readers assimilate the material. Stories and simulations play a large part of the assessment and validation processes, and most of the outcomes are vague and uncomfortable. Many organizations are not prepared to deal with such haziness.

Since it is VUCA that is being addressed, there are no definitive recommendations or prescriptions for how to reach or recognize an acceptable conclusion. In fact, the last chapter is composed entirely of "Hints and Hows" that facilitate the journey and doesn't deal with how to recognize the best result. Still, the information presented in this book must be considered in any attempt to improve readiness for the future.

Reviewed by Marc A. Feldman
Solvay Chemicals
Houston

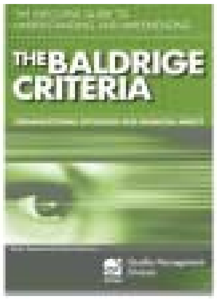
The Executive Guide to Understanding and Implementing the Baldrige Criteria

Denis Leonard and Mac McGuire, ASQ Quality Press, 2007, 120 pp., $29.40 list, $16.80 member (book).

As the title suggests, Leonard and McGuire have produced a book aimed at CEOs and senior executives who are interested in pursuing the Malcolm Baldrige National Quality Award criteria. But even if you're not a CEO and merely need to understand what Baldrige is, the benefits of the criteria, the requirements and the resource commitments, this is a good place to start.

The book begins with a Baldrige model overview, as well as a description and discussion of the model's seven organizational profile categories and the value of completing the profile questionnaire. The possible outcomes of implementation are discussed in a frank manner with the help of a table listing advantages and disadvantages.

Quickly moving to the financial impact of Baldrige, the book cites numerous research studies linking Baldrige with various financial metrics and indicators. Next, the value of self-assessment is reviewed, and resulting nonfinancial improvements that could result are discussed. Finally, short chapters address implementation, the site visit and feedback, which are illustrated using six brief case studies.



This book is exactly what it purports to be: an executive guide to the Baldrige criteria. It provides a very good, executive-level discussion of what Baldrige is, but it is not a step-by-step guide to implementation. If you want a cogent discussion and salient overview of Baldrige, however, this is it.

Reviewed by James Kotterman
APL Logistics
Woodridge, IL

Batchin'

Mike Micklewright, QualityQuest Inc., 2007, $195 (DVD).

This is an extremely entertaining DVD that illustrates bad batch processing using the flow of activities in a home. While this is presented in a nontechnical and humorous way, Micklewright, also known as the Whys Guy, actually builds the flow process of doing laundry into a standard current-state map. In the process, he explains and illustrates the amount of wasted time that is eliminated through the use of an easy-to-understand flowchart that conforms to quality standards.

By examining smaller batches and the piece flow of the laundry process, he is able to show a reduction time of more than 30% for the laundry process. Micklewright successfully uses an activity familiar to anyone and everyone to educate the viewer. As a result, this DVD is a novel way to introduce the concepts of batch processing to a broad audience.

The DVD is long enough to provide a good introduction to quality processes to a group and then allow the group to work on its own streamlining before viewing the final chapters. This would be appropriate for introducing quality processes at all levels, starting with high school statistics students and new employees with little experience in the quality field.

Reviewed by I. Elaine Allen
Babson College
Wellesley, MA

RECENT RELEASES

A Practical Application of Supply Chain Management Principles

Thomas I. Schoenfeldt, ASQ Quality Press, 2008, 224 pp., $50 list, $30 member (book).

BPM Basics for Dummies

Kiran Garimella, Michael Lees and Bruce Williams, Software AG, 2008, 72 pp. (book).

The *Kaizen* Event Planner

Karen Martin and Mike Osterling, Productivity Press, 2007, 240 pp., $50 (book).

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JUNE

2 ASQ Section Meeting. **Wausau Wood Chucks.** Wausau, WI. Call Kerry Sparks at 715-422-1552 or e-mail kerry.sparks@newpagecorp.com.

2-3 **Planning and Leading Lean *Kaizen* Events.** Somerset, NJ. Call Stat-A-Matrix at 800-472-6477 or visit www.statamatrix.com.

2-5 **Engineering Regulatory Compliance Conference.** Arlington, VA. Call Dave Hall at the International Society for Pharmaceutical Engineering at 813-960-2105 or visit www.ispe.org.

3 **Fundamentals of Color and Appearance Seminar.** Chicago. Call X-Rite Color Services at 888-439-4403 or visit www.xritecolorservices.com.

9-10 **Managing Supplier Performance: Measurement, Certification and Quality Improvement.** San Francisco. Call the American Management Assn. at 877-566-9441 or visit www.amaseminars.org.

9-11 **Lean Wave Regional Conference.** San Diego. Call the Association for Manufacturing Excellence at 224-232-5980 or visit www.ame.org.

9-12 **Safety 2008 Conference.** Las Vegas. Call the American Society of Safety Engineers at 847-699-2929 or visit www.asse.org.

10-11 **International Forum on Design for Manufacture and Assembly.** Providence, RI. Call Boothroyd Dewhurst at 401-783-5840 or e-mail info@dfma.com.

10-11 **Design of Statistically Valid Sampling Plans.** Guelph, Ontario. Call the Guelph Food Technology Centre at 519-821-1246 or visit www.gftc.ca.

10-12 **Breakthrough Management Group's Global Summit.** Denver. Call the Breakthrough Management Group at 800-467-4462, visit www.bmgi.com or e-mail eventinfo@bmgi.com.

16-20 **Advanced Design for DFSS 2.** San Marcos, TX. Call the International Society of Six Sigma Professionals at 480-368-7083 or e-mail info@isssp.com.

20 **Developing a Reliability Program Plan.** Denver. Call Hobbs Engineering at 303-465-5988 or visit www.hobbsengr.com.

25 ASQ Registration Deadline. **Texas Quality Cruise: A Seminar at Sea.** Galveston, TX. Call John Breckline at 817-401-0412 or e-mail jbreckline@usa.com.

29-JULY 2 **International Conference on Environmental Systems.** San Francisco. Call SAE International at 877-606-7323 or visit www.sae.org.

JULY

15-17 **Shock and Vibration Measurement.** Juan Capistrano, CA. Call Yeni Hoo at Endevco at 949-493-8181 or e-mail yeni.hoo@endevco.com.

16-18 **Statistical Analysis for Process Improvement Using Minitab.** San Francisco. Call Exsilon at 800-930-8528 or e-mail training@exsilondata.com.

21-25 **Coordinate Metrology Systems Conference.** Concord, NC. Call Jan Rode at the Coordinate Metrology Society at 425-802-5720 or e-mail registrar@cmsc.org.

22-24 **Principles and Practices of Process Improvement.** Denver. Call the International Society for Performance Improvement at 301-587-8570 or e-mail register@ispi.org.

23-24 **Supply-Chain World Asia Pacific conference.** Singapore. E-mail Shelly Koh at skoh@supply-chain.org or visit www.supply-chain.org.

AUGUST

23-25 **International Conference of Quality Managers/Asia Pacific Quality Organization International Conference.** Tehran, Iran. E-mail Hesam Aref Kashfi at the Iranian Society of Quality Managers at harefkashfi@neda.net or visit www.qm-conference.com.

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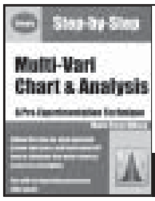

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BACK TO BASICS BY HARRY COIFMAN

A Call for Improvement

Use basic tools to ramp up call centers

IT'S A COMMON perception that customer phone support is a resource-draining operation. This results in many call center cost reduction projects but few process improvement initiatives. Basic tools can be used to improve a call center. The scope of this article is an inbound technical support or issue resolution environment. With a few modifications, the method described also can be applied to sales calls.

The first step is to recognize the four phases of a call: greeting, root cause identification, issue resolution and closure. The greeting step includes answering the call, locating the customer's account and authenticating the caller. In the closure stage, customer expectations for off-line processes are set, and the account is documented. The root cause identification and issue resolution steps tend to be rich with improvement opportunities.

Understanding the current state

Currently, many call centers collect volume and time data. This information is rarely collected by call type, however, and manual collection might be required. It is impractical to pursue all call reasons, so use a call-volume and customer-impact weighted matrix to prioritize your efforts.

Customer impact weights are usually rated on a 1 to 10 scale. Make sure rankings are based on customers' opinions, not perceptions. If results need to be presented, a Pareto chart provides an easy-to-understand format. Focus on the highest-ranking call reasons.

The remaining reasons should be covered in subsequent cycles of your continuous improvement (CI) program.

Next, focus on understanding the process for the top issues. A decision tree provides a useful visual. Place the callers' symptoms at the top of the tree, the resolution at the bottom and the decisions required to identify the appropriate resolution in between.

Creating a future state

Having prioritized the call reasons and documented the current process, the future state can be addressed. Convert the decision tree into a process map, and complete a value added analysis. Then, research best practices, and create a standardized resolution for each call type.

Customers don't want to experience problems, but if one does occur, they expect a quick and effective resolution. Ideally, the root cause should be eliminated, but if this is not viable, optimize the call flow by eliminating redundant or non-value added work. Avoid transferring the call—surveys have shown this call reduces customer satisfaction by 20%.[1]

Make sure the agent has the necessary tools, authority and knowledge to resolve the issue. A survey by Mike Desmarais, president of Service Quality Measurement Group Inc., found that issue resolution is the most important factor for the caller.[2]

When designing the new process, controlled customized solutions can be included. For example, solutions A, B and C can be offered to highly profitable customers and D, E and F to all others.

For example

After data and value added analysis, a service provider found that regardless of the call type, a certain procedure was always required. The company also discovered process inconsistencies—given the same scenario, agents' methods differed, resulting in erroneous conclusions and ineffective resolutions. Also, the company found various instances when a customer would call multiple times to "fish for a good agent."

In response, the company created a desktop tool that assists agents during the decision process. The agent selects the symptom from a drop-down list. Based on this input and other data automatically collected by the system, the desktop tool provides the recommended actions, which the agent can override. This tool reduces call handle time and guarantees consistency.

This process should be incorporated into a CI process. Also, validate that off-line processes meet the expectations set during the call. Otherwise, your efforts will be offset by the subsequent experience. Don't forget that eliminating the root cause is preferable to managing it. If this is not feasible, however, the approach will help build a more effective customer support process.

FIGURES ONLINE

Three supplemental figures and tables for this article can be found at www.qualityprogress.com.

REFERENCES

1. Service Quality Measurement Group Inc., "Contact Center Call Escalation Benchmarking Study," http://sqmgroup.com/escalation.html, March 2007.

2. Mike Desmarais, "Let Your Call Center Customer Service Representatives be a Judge!" https://brc.manpower.com/BRC/files?name=Let_the_CSR_be_a_Judge_Article_09_27_06.pdf (case sensitive), September 2006.

HARRY COIFMAN is an associate director of operational excellence for MCAP, a mortgage and equipment financing company in Toronto. He earned a bachelor's degree in industrial engineering from Northwestern University and an MBA from McGill University. Coifman is an ASQ member and a certified Six Sigma Black Belt.

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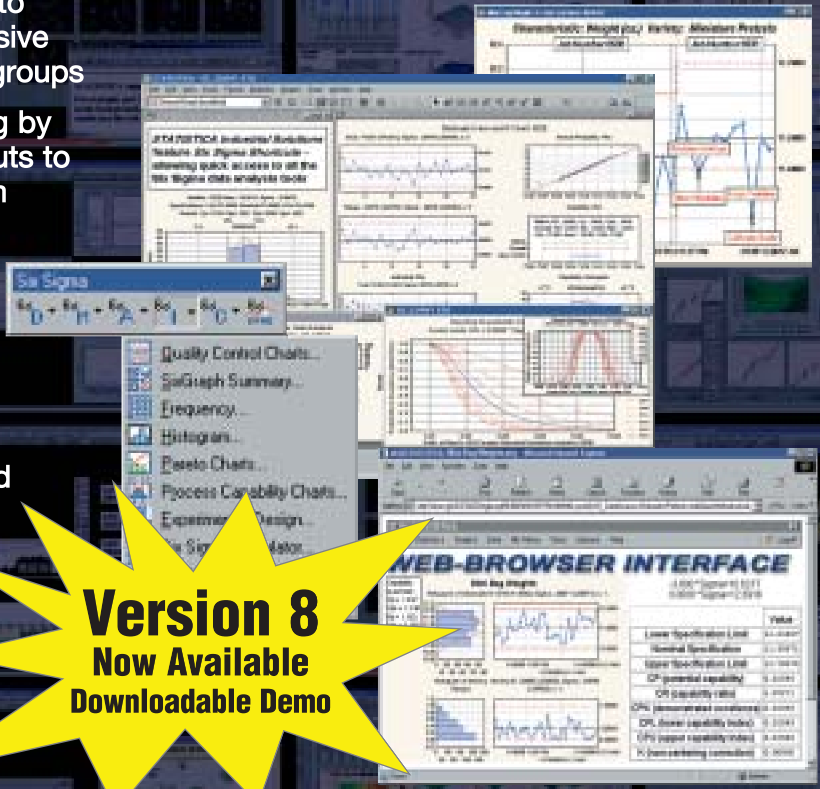

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